PRIFYSGOL BANGOR UNIVERSITY

FORESTRY@BANGOR
NEWSLETTER

2022

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WELCOME

From Professor Iwan Davies, Vice-Chancellor

The last forestry@bangor newsletter was published in January 2020, since when we've all experienced huge changes in our working and personal lives. Yet it has also been a time during which people have come together to create solutions and opportunities, to really make a difference.

Hence, I am delighted to present to you our 2022 forestry@bangor newsletter. It contains glimpses into what goes on in the lives of our students, staff, and alumni, such as the career highlights of the 'class of 1960'.

It celebrates research successes and shares stories of highlights, awards, prizes, and achievements. It illustrates that in the face of the challenges of 2020 and 2021, this dynamic and committed global community of students and staff really has thrived.

I believe this newsletter will be a source of optimism and enjoyment for our alumni, many of whom may have wondered what has happened in our University these past two years, and I hope it will encourage those who might be considering studying, or working, or linking up with forestry@bangor to get in touch. As always, we are indebted to alumni for their generous and unconditional support.

Yours,

Professor Iwan Davies
Vice Chancellor, Bangor University

February 2022

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FORESTRY@ BANGOR: A STORY OF RESILIENCE AND DIVERSITY DURING THE GLOBAL PANDEMIC

By James Walmsley, Morag McDonald, Mark Rayment and John Healey

The global pandemic has challenged us all, in unique and unexpected ways. For those in education, many teachers, lecturers, students and pupils found the switch to online learning to be stressful, difficult, frustrating and isolating. Yet for those studying on the forestry degrees at Bangor University, following the switch to fully online learning in March 2020, it was pretty much 'business as usual'. We have been running distance learning programmes since the early 2000s and for the past eight years, much of our postgraduate teaching has been offered in a 'fully-blended' format: students can participate in all aspects of their degree programme, regardless of whether they are physically in Bangor, or studying online from Bangladesh, Belgium, Brazil or any other place on the planet that has sufficient internet connectivity.

Lectures are streamed live, questions are asked and answered, and they're recorded, so those unable to watch in real-time can catch-up where and when it suits them. Even learning that is largely discussion-based is "blended", meaning that students can join in from wherever they are in the world, or watch the recording afterwards. These discussions are based on pre-set reading, so that even when students can't participate live they can send in pre-recorded input to share if they want to, for example, at seminars and student presentation sessions. Student group work, including analysing data, researching topics and preparing presentations to deliver to the rest of the class, continued on-line to a very high standard for all our degrees during the 2020-21 academic year, and allowed students to get to know their peers, and provide support to each other, during the various lockdowns.

We were able to utilise this wealth of on-line learning experience in the delivery of our undergraduate BSc forestry degrees, which switched to fully online in March 2020 and largely remained online until the summer of 2021.

Lectures, seminars and presentations moved, almost seamlessly, online and we're happy to report that student engagement and performance did not drop off at all. In fact, some of our lecturers noted that student performance actually improved, suggesting that for our students, when the going gets tougher, they have the resources – and the resilience – to rise to the challenge.

As a University, Bangor pulled out all the stops to enable us to carry on with our programme of field practicals for the students based in Bangor throughout the academic year, many facilitated by our fantastic network of alumni. As always, for many of our students these were the highlight of their degree and this was particularly so as a release from locked-down living and studying and a rare chance to actually meet with each other. We missed out on our regular Scottish forestry tour last year, but we rediscovered some wonderful places in our backyard in North Wales. We also started to diligently film all of our field practicals to allow students who were not able to join in person to follow the practical live (where mobile phone signal was sufficient) or else watch later.

The 'class of 2020' graduates have gone on to secure many fantastic opportunities: testimony to their commitment and resilience, and the inspiration and support they received during their time with Forestry@Bangor. The majority of students undertaking 'sandwich year' placements during 2020-21 were able to continue these without undue disruption – as usual, they gained a huge amount from this valuable experience. For the first time, Natural Resources Wales hosted an excellent placement programme, which is currently recruiting for 2022 placements. We now have the curious situation that, for the last few years, there are more advertised, paid placements than there are students to apply for them.

Throughout the lockdowns the Bangor Forestry Students Association was as proactive as ever, organising an excellent series of evening talks by a wide range of forestry professionals and other on-line events (for more details about BFSA, keep reading!). One of the great benefits of the switch online is that BFSA now broadcasts all guest lectures 'live' meaning that talks can go ahead online regardless of Covid restrictions and that all students, regardless of where they are studying from, can engage and participate. It also means that distance learning students can now take on meaningful BFSA committee roles.

As a result, we are very confident that Bangor forestry students during the era of Covid will be graduating with the same high levels of knowledge of a diversity of forest types and operations, and skills in forest inventory and management planning, as usual.

From the start of the 2021-22 academic year, in contrast to many courses in other universities, Bangor's full-time forestry degrees moved back to face-to-face teaching for lectures, practicals and tutorials, with appropriate social distancing and ventilation of course. And it is clear that our students (well, most of them at least!) have really appreciated this resumption of a more human interface in their education.

We have learnt a lot from the experience of delivering education during the pandemic and in the future hope to continue blending the best that the worlds of 'face to face' and online learning have to offer, with the capacity to rapidly adapt our provision. We are confident that the whole set of fine young (and not so young!) people who have graduated since we wrote our last newsletter are every bit as equipped to take on the challenges of a career in forestry (or elsewhere) as Forestry@Bangor students have been for the last 118 years.

Forestry@Bangor has shown remarkable resilience since it was founded in 1904, enduring two World Wars plus various other economic, social and political upheavals. We believe that the challenges we experienced during the pandemic – and the various outcomes reported here – have further strengthened this resilience, just like a well-managed forest, to the benefit of our students, graduates and staff. Our approach as always has been to curate a positive 'can-do' attitude and to create a sense of community. During the pandemic we consistently emphasised (where appropriate) that the lack of any face-to-face interaction was not the 'fault' of anyone in forestry@bangor: instead it was us as a community that had to find solutions together to continue our learning and teaching.

The start of the academic year 2021-22 saw our last cohort entry for the European Erasmus Mundus MSc in Sustainable Tropical Forestry (SUTROFOR). This programme has been jointly delivered by a consortium of 5 European HEIs: University of Copenhagen, Bangor University, Technische Universität Dresden, AgroParisTech, Montpellier and the University of Padova. We have graduated ~ 300 largely international MSc students since 2006 from >35 countries. This has been a hugely enriching programme and we would like to thank all our alumni for their enthusiastic participation, and bringing such rich cultural diversity and wealth of professional experiences. We wish all of our alumni all the best in their flourishing careers.

Forestry@Bangor can also report improvements with various measures of *diversity* over the last two years. Despite the uncertainties created by Brexit and the Covid pandemic, we currently have students from more than twenty countries studying Forestry@Bangor programmes. Further, our fastest growing programme (in terms of applications and student numbers) is MSc Agroforestry and Food Security, on which more than half the students are women. How times have changed since one of our most famous alumni, Mary Sutherland, became the first women to graduate with a forestry degree on the planet in 1916. Since the previous newsletter, we have further diversified the staff and expertise of those contributing to Forestry@Bangor programmes: you can 'meet' these new staff later on in this newsletter.

The success of Forestry@Bangor is not simply an imagined reality that exists only in the minds of students, staff and graduates. The Times / Sunday Times Good University Guide 2021 ranked us as 1st in the UK for 'teaching quality and student experience' in the subject areas of Agriculture and Forestry. We were one of just three subject areas in Bangor University to achieve 100% 'overall satisfaction' in the National Students Survey 2021: the opposite of what has been reported nationwide in terms of student experience. The Royal Forestry Society also recognised our efforts us in their 2021 Excellence in Forestry Awards.

We are fully aware of the evidence of a rapidly developing 'Forestry Skills Crisis'. We very much believe that:

- by offering degree programmes available in a range of formats (full-time or part-time; residential or distance learning),
- by attracting students of the very highest calibre (be they recent school or college levers, or "career changers" at a later stage of their lives),
- by undertaking research that is timely, relevant and impactful,
- and ensuring that our teaching is informed and underpinned by the very latest knowledge and inspiration that this research has generated,
-

Forestry@Bangor will continue to make an important contribution towards tackling this 'crisis'. As an example, in December 2021 two of our part-time MSc distance learning students, both of whom are 'career changers', proudly reported to us that they have taken on woodland creation roles in England and are now putting into practice much of what they have learnt during their degrees. Will our graduates ensure that the woodlands of the future will be more resilient and more diverse than many of those that were established in the 20th century? We certainly believe so.

Images © Daniel Ridley

IS THE LECTURE ROOM GOING TO SURVIVE?

By Alec Dauncey, Lecturer in Forestry (PhD Forestry 2016, BSc Forestry 1981)

forestry@bangor has been teaching forestry remotely for some time and that stood the forestry team in good stead when the Pandemic struck suddenly. Society in general is pondering how the Pandemic changes may permanently change the ways we work and interact with each other!

If we have gone to the trouble of being together in the same city (yes, Bangor is a city!) and campus, is the best teaching activity gathering in a lecture room?

Being back in a lecture theatre since face-to-face teaching restrictions have been lifted has made me ponder whether it is 'better' than working online… Some students are more engaged and responsive via the text message style of online questions and answers, perhaps it engages those who do not like piping up in public? Guest lectures from people with experience are far easier to arrange; those unable to attend events 'in person' at a pre-arranged date and time are not excluded; they can join 'live' or watch and listen to recordings later. Interactive polls and whiteboard exercises can be used to great effect, enabling participation, teamwork, and reflection.

Some of this just brings forward questions which were already arising. I and some of our readers have sat on the wooden benches here at Bangor (eds note: room G2, Thoday building still has these!), making copious notes from carefully assembled lectures. Our lectures are still carefully assembled of course! But in days gone by it was much harder to easily explore topics further after the lecture (or beforehand). If we were interested in a particular issue, we had to look in the library index or periodicals room. Now a student can search the academic world for journal texts, on their phone, during a lecture (not all my colleagues encourage this!). As a lecturer and teacher, I know that a student can have read more of the latest articles on a given, perhaps niche, part of a subject than I have, within hours of a lecture outlining the scope of it. They can then share their new knowledge with me and their fellow students…

Most of human knowledge is available on a device in our pockets, as academics we are increasingly guides, and interactive sharers of concepts, experience, and methods. And, most importantly, posers of questions!

Being together?

In the end we are social animals, there is something about being in a room with all the little clues we have, body language, raised eyebrows, long gazes out of the window etc. This means that when we *are* together, we need to do the most interactive things we can; collaborate, debate, argue, deal with the more complex conceptual things. We can then recognise whose face shows puzzlement (or challenge!) about 'visual forces' in a landscape, or discounting and the potential undervaluation of future generations.

"Is the best teaching activity gathering in a lecture room?"

And what of the forest visit and field work?

There is no real replacement for the field visit to the forest. But even in this we have been forced to explore the cyber alternatives. Pandemic freshers had an introductory cyber visit to a forest in Scotland, with a lone lecturer and wobbly phone camera, stumbling through the undergrowth. Not ideal, but capable of being polished as an idea. Students have completed very competent management plans for places they have been unable to visit. With Google Earth, Street View, and a library of videos and images from staff, it is almost possible to feel that you have been there… Students in Zvolen (Slovenia) can make thinning decisions in a virtual forest, with growth models included (Fabrika et al. 2018).

Being in the forest

But of course, you cannot really replicate checking the light conditions, canopy, ground flora and a quick kick to see how wet the soil is... Or is it just a matter of time before virtual reality headsets do some of that?

What can you do?

Coming back to earth from these musings, this newsletter is intended to reach our alumni. One clear thing we and others have found, is that the leap into online 'meeting' makes it easier for those with experience and expertise in the 'real world' to share that with students. A guest lecture, or seminar, or Q&A in cyber 'room,' is far easier to organise than a trip to Bangor, so please do stay in touch with forestry@bangor!

NEW FORESTRY@BANGOR STAFF

Eleanor Warren-Thomas started work at Bangor University in June 2020, funded by a NERC-IIASA Collaborative Fellowship, to investigate the potential consequences of meeting ambitious forest restoration targets in Colombia. In August 2021, she was offered a proleptic lectureship in the School of Natural Sciences, so will contribute to teaching in the areas of conservation science, ecology and (agro-) forestry from 2023 onwards. She is currently working with two teams at IIASA (the International Institute of Applied Systems Analysis, Austria) to use spatial-economic models to understand how changes in forest cover through restoration might influence deforestation rates in distant locations through market feedbacks. She will also be looking at the effectiveness of forest restoration initiatives, and potential outcomes for biodiversity using species distribution models.

Eleanor has a BA in Biological Sciences from Oxford University, an MSc in Conservation Science from University College London, and a PhD from the University of East Anglia. Her PhD research focussed on rubber (*Hevea brasiliensis*) plantations as a driver of deforestation and biodiversity loss, and on opportunities for livelihood and biodiversity benefits in rubber agroforestry systems; she still retains an active interest in rubber supply chains and sustainability.

Prior to joining Bangor, she worked at the University of York for two years as a post-doc, researching the effects of peatland restoration in Indonesia on smallholder oil palm farmer livelihoods and biodiversity, and on peat forest habitat connectivity.

Ashley Hardaker joined the Foresty@Bangor team at Bangor University in June 2020 as Postdoctoral Research Officer in Land Use Sustainability Metrics funded by the Sir William Roberts Centre for Sustainable Land Use to build the centres capacity for collaborative interdisciplinary research. He is currently working with colleagues in the School of Natural Sciences (Bangor University) to understand how different types of woodland creation can enhance the sustainability of livestock farming systems and the University of Limerick to explore the potential for life cycle assessment methodologies to be expanded to include ecosystem services. Ashley is also working closely with Norman Dandy (Director of the Sir Williams Robert Centre) to continue the centres outreach and engagement activity and developing grant applications to continue the centres land use research portfolio.

Ashley has a BSc (Hons) in Rural Land Management from The Royal Agricultural University, an MSc in Environmental Forestry from Bangor University and also recently completed his PHD here in the School of Natural Sciences at Bangor. His PhD research explored the impacts of woodland creation on ecosystem service provision from the Welsh uplands and pathways to navigate trade-offs between public and private benefits of tree planting on farmland. Prior to coming to Bangor back in 2015 to pursue his MSc, he worked as an assistant agricultural surveyor for a small firm of agricultural valuers in the Yorkshire region, advising farmers and land managers on subsidy claims, agri-environment schemes, farm management and tenancy/property valuation matters. He looks forward to continuing to work with the Forestry@Bangor team on topics such as farm woodlands, agroforestry, natural capital and ecosystem services.

Farnon Ellwood joined Bangor University in November 2021 as a lecturer in ecology and conservation in the School of Natural Sciences. A Fellow of the Royal Geographical Society (FRGS) and the Royal Society of Biology (FRSB), Farnon is interested in the patterns and processes structuring tropical rainforests. His field site is in Danum Valley, an area of pristine tropical rainforest in Sabah, Malaysian Borneo. Farnon also works in the oil palm plantations encircling Danum Valley, which range in size from smallholders to the Sabahmas plantation owned by Wilmar International, one of the largest palm oil producers in the world.

Much of Farnon's experimental work, funded by the Natural Environment Research Council (NERC) and the Royal Geographical Society (RGS), uses the invertebrate inhabitants of bird's nest ferns (the tropical epiphyte *Asplenium nidus*) as a model ecosystem. Bird's nest ferns, each weighing as much as 200kg, occur throughout the rainforests of Southeast Asia, Africa and South America. Common houseplants, bird's nest ferns can also be found in most garden centres. His work combines theoretical ecology with experiments to understand how the evolutionary relationships of tropical arthropods affect their ecological interactions—between each other, and with the environment. Using a range of canopy access techniques borrowed from caving and mountaineering to work at heights of ~60 m [that's equivalent to a 15-storey building] in the rainforest canopy is challenging, both physically and technically. Nevertheless, Farnon's work has doubled the estimate of invertebrate biomass in a rainforest canopy, revealed the hidden processes that structure tropical arthropod communities, and discovered that oxygen isotopes can be used as atmospheric imprints of climate change in insects. He recently tested the famous metaphor invoked by G. Evelyn Hutchinson in his book *The Ecological Theater and the Evolutionary Play*, by comparing the phylogenetic relatedness with the functional overlap between the microbial communities of suspended soils in congeneric bird's nest ferns growing in the canopies of rainforests on different continents (Donald et al. 2020 *Acta Oecologica* 106).

Farnon's ultimate goal is to develop theoretical frameworks that can be used to conserve tropical biodiversity by informing sustainable management practices. Recent reviews (2020-21) with national and international collaborators include "A research agenda for microclimate ecology in human-modified tropical forests" (*Frontiers in Forests and Global Change*) and "Public engagement promotes consumer choice in favour of sustainable palm oil" (*Journal of Oil Palm Research*).

This review of the "palm oil paradox" includes original research conducted alongside Farnon's oil palm exhibit situated at the heart of the world's largest indoor rainforest at the Eden Project in Cornwall. Elsewhere, with Professors Chengjin Chu of Sun Yat-sen University and Dexiecuo Ai of Lanzhou University, Farnon is working towards a theoretical understanding of species coexistence and the functional relationships between invertebrates and soil microbes.

Farnon's first degree was in Agriculture from Harper Adams University; his second undergraduate degree was in Zoology from Newcastle University, followed by a PhD from the University of Cambridge. Before joining the Bangor family, Farnon worked at Cambridge, UWE Bristol and the University of Birmingham. Every now and again Farnon advises the BBC Natural History Unit [Google Farnon Ellwood tree trigonometry], acting as scientific consultant for series such as Jungles, Wonders of the Monsoon and One Planet, and is a regular contributor to the Al Jazeera television network. Farnon's textbook reviews include *The Sting of the Wild* for The Times Literary Supplement, in which entomologist Justin O. Schmidt is voluntarily stung by the world's most painful insects. The winner and all-round champion of the Schmidt sting pain index was the tarantula hawk, a truly magnificent wasp with a sting producing pain that is "instantaneous, electrifying, excruciating, and totally debilitating."

Heli Gittins extended her role at Bangor University to join the Forestry team in November 2021 and will be contributing to teaching and dissertation supervision. She also lectures on the MSc Environmental and Business Management and on various conservation modules. Her PhD research, completed in November 2021, used a mixed-methods approach to investigate short and long-term social, physical and mental wellbeing impacts of a nature-based intervention, Coed Lleol (Small Woods Wales)'s Actif Woods Wales programme. She also explored how the programme affected participants views and independent use of woodlands. This was a cross-disciplinary project between the School of Natural Sciences and the School of Psychology (Bangor University), in partnership with the Woodland Trust. Alongside her post at the university, she now works part time for Coed Lleol offering mindfulness courses and nature-based activities. She came to Bangor in 2007 to study MSc in Conservation and Land Management, after which she worked at the University on two knowledge transfer programmes – a farming and climate change development programme and a sustainable business project.

FAREWELL TO DR RUBÉN VALBUENA

By John Healey and James Walmsley

Dr Rubén Valbuena, known only to the past four years of forestry@bangor students, is now Professor Valbuena. Ever Since Rubén arrived in Bangor in 2018 as Lecturer in Forest Sciences his career has seen a meteoric rise culminating in his appointment to the prestigious Professorship of Remote Sensing of Forests at the Swedish Agricultural University (SLU) starting in January 2022. Based in Umea, Rubén will lead the large remote sensing research group developed by his predecessor Prof. Håkan Olsson.

During his three years with forestry@bangor, Rubén rapidly established a global reputation as a leading researcher in pushing the frontiers of the application of remote sensing to a wide range of applications in forest assessment and monitoring. His primary focus was to harness the amazing power of Light Detection and Ranging (Lidar) to capture precise data of forest three-dimensional structure (down to ground level), at large scales. This has enabled a series of important advances (of huge significance for forest practice and policy) in detecting forest height, structure and disturbance impacts, and particularly to provide a fundamental improvement in capacity to estimate forest biomass (and thus above-ground carbon stocks) via remote sensing.

Rubén's work was characterised by a superb skill at networking with a wide range of collaborators and key institutions around the world, giving him a major role in important advances from the tropics through temperate and boreal biomes. Rubén was instrumental in achieving a huge strengthening of Bangor's institutional links with the prestigious European Forest Institute. This was crucial for a number of important new outputs providing key evidence to fundamentally alter the evidence base underpinning crucial, and politically contentious, aspects of European Forest Policy.

At the same time Rubén used his expertise to transform the key component of our degrees on forest inventory, assessment and monitoring. He led the specialist MSc module in this subject bringing it up to date with the latest methods in remote sensing technology and data analysis, while still focusing on fundamental aspects of sampling design for on-the-ground inventory. He made similar developments to the inventory component of our second year BSc programme, as well as to various study tours and field trips.

Rubén also took his role as a tutor and supervisor of BSc and MSc projects very seriously showing considerable attention and dedication to these students. One of his students, on gaining a PhD position in Canada recently, wrote to Rubén over the festive holiday season with the words "*All I have to say is thank you for the impact you made in my academic career, and I will forever be grateful for the knowledge instilled in me. Like Santa, you have filled my life with new hope and energy to face life*". He had also started to build a new research group of postgraduate research students working in forest remote sensing, which he will be able to accelerate further in SLU.

Rubén will leave us with great memories, not least for his enthusiastic participation in a range of social events and his skilled hand at conjuring up Spanish cuisine 'in the forest'. On one occasion, he masterminded a feast that fed more than 60 people in sub-zero temperatures on a study tour in Scotland [see image]. And Rubén has made it clear what a positive experience his time at Bangor has been for him. Shortly before his departure, he said, "*I just hope I have managed to give back to Bangor half of what Bangor has given to me, and that you all are left with a good feeling that I've been a nice colleague to share time and work with, and that my legacy left at the module on forest inventory, assessment and monitoring will supersede me and last well beyond my modest contribution to it.*". We will miss each other greatly but look forward to plenty of co-operation in the future. It is great news that Bangor University has agreed to fund a replacement Lecturer in Forest Sciences, for which short-listing is currently under way.

FURTHER ACCELERATION OF THE REACH AND SIGNIFICANCE OF BANGOR UNIVERSITY'S RESEARCH ON FORESTS

Research by Bangor staff on forests has continued its steep trajectory of growth over the past two years, with our international journal papers increasing by 40% (from 93 during 2019-2020 to 130 during 2020-2021). 2021 also marked the University's submission to the UK government's "Research Excellence Framework" (REF) assessment of universities (the previous cycle was in 2014). Most research in the Schools of Natural Sciences and Ocean Sciences was submitted to the "Earth Systems and Environmental Sciences" unit. For this our 188 best papers published during the seven years were selected. Forest science provided 17 (9%) of these, with a further 15 papers on terrestrial conservation topics: a substantial contribution to the University's research prowess.

As previously, during 2020-2021 a substantial proportion of our highest status research outputs were on **tropical forests**. Sadly, a major new focus has been on deforestation and other changes in land cover, including impacts on carbon sequestration and biodiversity conservation, much of the research involving advanced modelling. A growing topic has been the developing impact of climate change on forests, as well as the contribution that forests can make to its mitigation. This research has shown the high above-ground carbon stock of African tropical montane forests, but that tropical forests have long-term sensitivity to the effects of warming. Their capacity to continue acting as a carbon sink has already declined in the Amazon, though it is currently continuing in Africa. Large forest ecosystems are at risk of collapse over a timescale as short as decades. While abandonment of agriculture in the Amazon has led to a large area of secondary forest regrowth this only offsets less than 10% of the carbon emissions caused by continuing deforestation of old-growth Amazon forest. Global patterns of forest loss were detected across the IUCN categories of protected areas.

Remote sensing is becoming an ever more important tool for measuring and monitoring tropical forests and Bangor established a major reputation in this research area. Droughts linked to the El Niño Southern Oscillation are having an increasing effect and LiDAR remote sensing in Borneo has shown that fragmented tropical forests (within a matrix of oil palm plantations) are more vulnerable to a reduction in canopy height growth. Important technical advances were made in a wide range of remote sensing applications, including to (i) quantify the global forest above-ground biomass pool, (ii) improve the accuracy of land cover classification, (iii) characterise protected areas globally, (iv) predict fuel load in tropical savanna, (v) detect successional changes, (vi) determine the impacts of selective logging, (vii) survey forest structure and even (viii) individual tree attributes.

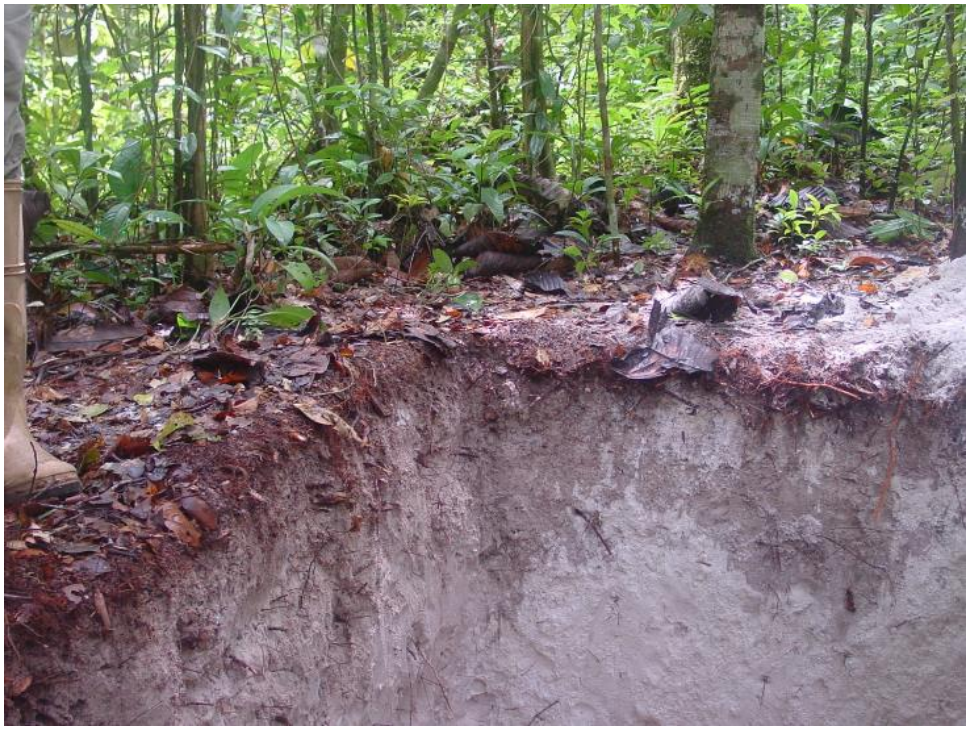
Another notable development over recent years has been the growing importance attached to the "**ecosystem services**" framework covering the wide range of benefits that forests provide to people. This too has become a rapidly expanding area of Bangor research, with a number of innovative multidisciplinary projects. To provide the best evidence for the policy response an important facet of this research has been the development of future scenarios of biodiversity and ecosystem services reflecting the linkages between people and nature. These have been applied to objectives such as identifying priority areas for conservation in the Brazilian Cerrrado.

Images:
Above: Forest degradation in the buffer zone of Budongo Forest, Uganda

Left: Deforestation of miombo forest east of Morogoro in Tanzania

Bangor research has also seen a marked expansion of work **on social aspects of tropical forests linked to many aspects of policy**. This has provided new insights into the decentralization of forest governance, and process and outcomes of participatory and community-based forest management from east Africa to south-east Asia, including the crucial issues of governance and equity. The importance of gender for ecosystem services has been identified among indigenous communities in the Columbian Amazon. Important new insights have been obtained on the controversial issue of palm oil sustainability certification in terms of its impact on village well-being and poverty in Indonesia. A major new area of policy-linked research has addressed key developments in global forest conservation. Pioneering work has assessed the use of full randomized control methodology as a mechanism to produce more rigorous evidence of the complex mechanisms and impacts of an incentive-based conservation programme. Critical assessment has been made of the "no net loss" basis underpinning biodiversity offsets and other ecosystem services compensation schemes, and whether they are better replaced by a more target-based approach.

At the same time the well-established areas of Bangor tropical forest research in **ecology** has continued to produce a series of important outputs. A major ecological theme was the respective roles of resource availability, competition, disturbance and drought in controlling tree and seedling growth, maximum height and mortality. A new assessment has been made of the global abundance of tree palms[33]. New lecturer Farnon Ellwood brings to Bangor his research on the diversity and functional significance of the invertebrates and microbes of tropical forest soils, both in the ground and in the canopy (within bird's nest ferns).



A major application of our research on tropical/sub-tropical forest ecology and social science has been in the rapidly developing subject of **forest restoration**. Research in China has shown the importance of soil properties in regulating the soil microbial communities that are so crucial in restoration of ecosystem function, while forest regenerated after agriculture has been shown to have a positive effect on local hydrological ecosystem services in Madagascar, and new remote sensing methods have been developed to monitor the diversity and structure of restored tropical forest. The crucial role of social issues in restoration has been highlighted including the role of intrahousehold gender dynamics, the opportunities and constraints of using farmer-managed natural regeneration, and smallholder perceptions of restoration in the challenging environment of rewetted swamp land previously used for oil palm plantations. This research has culminated in an important policy paper on presenting ten people-centred rules for socially sustainable ecosystem restoration.

Images:
Above: White sand soil with a very thin organic surface layer under Amazonian forest in Peru

Left: Subsistence agriculture in a secondary forest mosaic on the lower slopes of Mount Cameroon

Images © John Healey

Our research on **UK and other temperate forests** has developed similar themes, but with differences in emphasis. The dominant area of research has spanned forest management, silviculture, ecology and ecosystem services. Innovative application of dynamic life cycle assessment to forest management options linked to the complexity of the forest products value chain, and future economic and technological scenarios, has provided powerful evidence that commercial afforestation can deliver effective climate change mitigation under multiple decarbonisation pathways. This has important implications for current debates about priorities for woodland creation. Remote sensing has provided key evidence to refute previous claims about a sudden increase of unsustainable harvest rates in European forests due to bioeconomy policy. Meanwhile a major theoretical and methodological advance has been made in determining maximum entropy in 3D remote sensing height distributions enabling a major improvement in aboveground biomass modelling via stratification. Other important applications of modelling have addressed the impact of climate change on the occurrence of frost damage in Sitka spruce. The diversity of ways in which forest ecosystems can influence the global carbon cycle was revealed by a high-profile paper showing that woody litter protects peat carbon stocks during drought.
Bangor's important research programme on acute oak decline has provided further new discoveries of the complex tree-bacteria-insect interactions that drive the virulence of this **disease**. Working at a broader scale linked to forest management, substantial new reviews have been completed on the effect of forest management options on forest resilience to pathogens and on the complex role of forested land for **natural flood management**.

A landmark overview has been published of the 20 years of success with **continuous cover forestry** of Sitka spruce at Clocaenog forest (a series of collaborative experiments between Forest Research, Natural Resources Wales and Bangor University). Looking back over a longer-period of forest management as a socio-ecological system new evidence has been published of the effect of prohibition regimes on the structure and species composition of sacred forests in northern Greece. A high-profile new research area has been an objective assessment of "**rewilding**" and all of its controversies amongst the range of stakeholders, resulting in a high profile paper setting out guiding principles. This is linked to a wider range of research into social aspects of forestry, including stakeholdership in forest and tree health, much of it carried out via the Sir William Roberts Centre for Sustainable Land Use.

The ongoing research of Honorary Research Fellow Craig Shuttleworth on the challenges **of red squirrel conservation and control of grey squirrels** (for which the Isle of Anglesey remains a major flagship) has produced important new papers on squirrelpox dynamics, its implications for red squirrel translocations, disease and invasive species monitoring and surveillance and on reinstating trophic cascades to protect forest ecosystems from grey squirrels.

While we have not carried out any fundamental research on **UK forest policy**, we have produced a series of outputs targeted at forestry policy makers and practitioners. Highlights include research commissioned by the Welsh Government: our contribution to the National Forest in Wales Evidence Review and our reports on Agroforestry in Wales and analysis of the viability of "land sparing" and "land sharing" strategies for commercial woodland expansion within Wales. Our collaboration with Woodknowledge Wales resulted in a set of six guidance notes on economic aspects of woodland creation for timber production and an analysis of the top five alternative conifer tree species in Great Britain.

Above: Fungal pathogen on mature ash tree in the Cotswolds
Below: Collaboration partners on a site visit to the experiments at Clocaenog forest

Continuing one of Bangor's best established research themes we have again seen a high level of research on **agroforestry**. Much of the focus remains in tropical environments (through our ongoing collaboration with World Agroforestry (now merged with the Centre for International Forestry Research (CIFOR)). This has produced new findings on perennial crop systems including the local knowledge of ecosystem services provided by trees with coffee in Vietnam, and a global review of rehabilitation of cocoa agroforestry systems. An expanding body of linked research has focused on non-timber forest products for food and medicine, including wild mango and yam, and the role of fruit trees in the biodiversity of smallholder rubber plantations. A notable development has been our growing body of research on temperate agroforestry including a major focus on Wales. This has produced new empirical evidence on how the effect of hedgerows on soil CO_2 emissions are regulated by soil type and season, and the nutritional benefit for livestock of the trace elements in tree fodder. Important new economic analysis at the landscape scale has shown the complex trade-offs of the benefits and costs for ecosystem services of alternative strategies for increasing tree cover on agricultural land in the Welsh uplands.

Outside our work on forests and agroforestry, there is an important link to other Bangor research, in both tropical and temperate environments, on **food security**, sustainable intensification of agriculture in terms of environmental impacts, social sustainability and agri-environment schemes. Co-ordination with these developments is crucial if land is to be spared from food production to allow substantial establishment and restoration of forest cover. Also linked to agroforestry has been an expansion of our research on **urban forests** spanning topics from soils to microclimate, with a major focus on China.

Wood science research remains a distinctive strength in Bangor, focused on the materials group in the University's Biocomposites Centre. Highlights include analysis of changes in climate-based decay hazard of timber in the UK, the use of CO_2 lasers to incise wood during its treatment and specialist treatment to preserve waterlogged archaeological wood.

An important component of the wider research environment in Bangor is UKCEH (the **Centre for Ecology and Hydrology**), which is located on the University campus in the Environment Centre Wales. Two of its senior staff, Chris Evans and Bridget Emmett, are Honorary Professors in our School and have a strong portfolio of research on forests. Landmark recent papers report on the impact of forest conservation[83] and plantations on greenhouse gas emissions from tropical peatlands, the effect of sub-tropical forest conversion to agriculture on dissolved organic matter in catchment and coastal environments, and the impact of wildfire on biogeochemical fluxes and water quality in a boreal catchment.

Images:

Above: Tree cover and ecosystem services in the Welsh uplands

Left: Hedgerow as shade and fodder for sheep

Images © John Healey

NEW PROJECT PROFILE: QUINTUS

By Andy Smith, Reader in Forestry

The SARS-CoV-2 pandemic created a challenging environment to start a major new research project; however, since the announcement of the QUINTUS (Quinquennial carbon and nutrient dynamics in temperate forests: Implications for carbon sequestration in a high carbon dioxide world) project studying the effect of nutrient limitation in a mature English oak (*Quercus robur*) forest was announced in the 2020 newsletter, Dr Andy Smith and his team have successfully collected an entire year of baseline above- and below-ground productivity and soil nutrient data throughout 2020, and nutrient addition (N, P, and N&P) treatments were started in March 2021.

During the summer months the Bangor-QUNITUS team extracted 1-metre-deep soil cores from nutrient addition and Free air CO_2 enrichment plots to assess changes to below-ground productivity and nutrient cycling. Data from this, and subsequent, field campaigns will be used to produce the next generation of Earth system models and reduce uncertainty in predicting the future magnitude of the terrestrial carbon sink.

Above top: Bangor students Chris Nunn, Jack Aitkin-Willoughby, Emma Hosker & Ed Roome helping with deep soil coring during our summer fieldwork campaign

Left: Percussion corer being used to core to a1-m depth

Above: Extracting a broken core barrel from the ground

Above: Some of the trial plots carpeted with bluebells (*Hyacinthoides non-scripta*)

Left: Extracting a 1-metre-deep core

Below: Dr Andy Smith installing a 30-cm-deep ingrowth core to measure fine root productivity

NEW PROJECT PROFILE: MEMBRA

By Andy Smith, Reader in Forestry

Bangor is consortium member of a major new study to explore if a tree's 'memory' can increase its resilience to environmental stressors led by the University of Birmingham and partnered by the universities of Bangor, Exeter, Leeds and Leicester. The MEMBRA (Understanding Memory of UK Treescapes for Better Resilience and Adaptation) project is one of six projects to receive a share of £10.5 million from the UK Research and Innovation Future of UK Treescapes Programme to develop new tools and approaches which will help trees and woodlands adapt to climate change and enable the UK to reach net zero greenhouse gas emissions.

Expanding the UK's trees, woodlands and forests will play an important role in realising the Government's ambition to achieve net-zero greenhouse gas emissions by 2050. However, our treescapes need to become more resilient to pressures such as changing climate, disease, and competing demands for land in order to reverse decades of decline in biodiversity and environmental quality. The study will begin to fill the gaps in our current limited understanding of how past experiences impact adaption to different environmental stresses.

The project is truly transdisciplinary and includes researchers in classics, molecular biology, ecology, and the Walking Forest art collective.

IMAGES:
Above: MEMBRA project team members pictured at the kick-off meeting at the Exchange Building, Birmingham, December 2021.

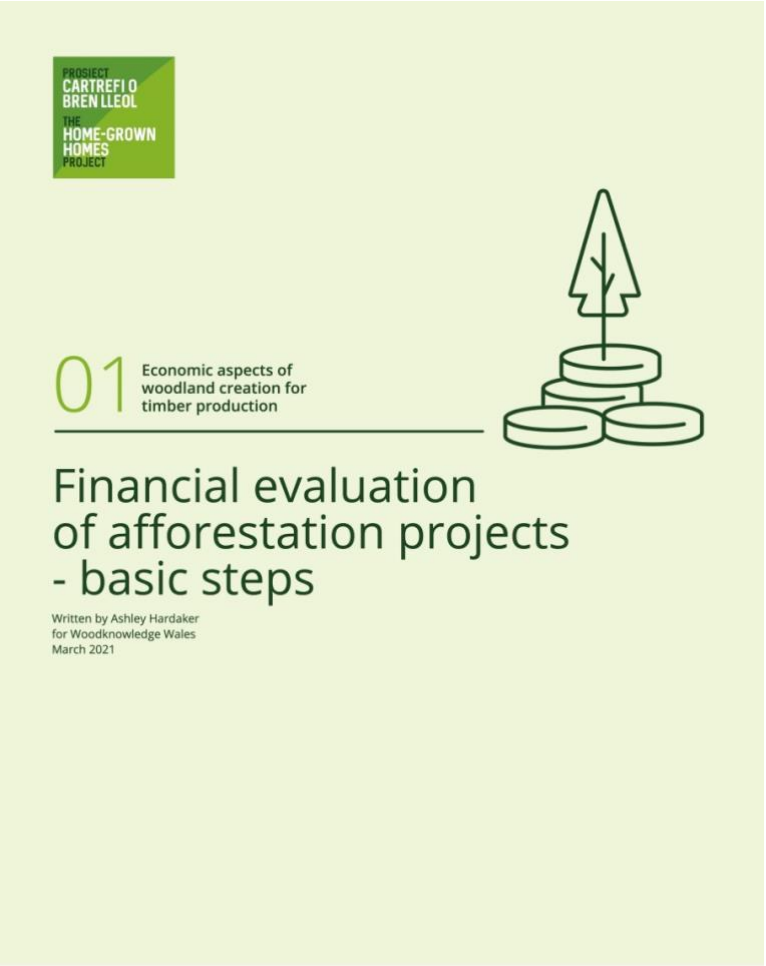
Left: Dr Andy Smith joining intense discussions at the MEMBRA In-person kick-off meeting at the Exchange Building, Birmingham, December 2021.

COLLABORATION WITH WOODKNOWLEDGE WALES: SELECTION OF ALTERNATIVE CONIFERS AND GUIDANCE ON ECONOMICS OF WOODLAND CREATION

The UK has significant aspirations for woodland expansion as a reaction to climate change. A major portion of this will be delivered through commercial plantations and also through tree planting and woodland creation on farms. Ensuring the resilience of productive plantation woodlands and engaging farmers with woodland creation and timber production are two big challenges for mitigating the climate emergency and meeting tree planting aspirations. Researchers at Bangor university worked closely with Woodknowledge Wales on two pieces of work to go some way to addressing these challenges. Woodknowledge Wales is a rapidly expanding not-for-profit public good organisation championing the collaborative development of forest-based industries for increased prosperity and wellbeing in Wales. It is led by forestry@bangor alumnus Gary Newman.

In January 2021 Woodknowledge Wales were commissioned by Welsh Government, in collaboration with Bangor University, to review and identify the top five alternative commercial tree species suitable for meeting current and future timber demands that were likely to be resilient to increasing potential pest and pathogen pressures resulting from changing climate. Bangor University researcher Dr Ashley Hardaker along with recent alumnus Dr Tim Peters took a leading role in carrying out the review and report with advisory input and guidance from Professor John Healey. The report assesses and ranks the suitability of a wide range of alternative conifer species that may be fit for diversifying conifer plantations in the future. The Project report in English and in Welsh along with more information on the project can be found on the Woodknowledge Wales Website.

Building on this initial collaboration, Dr Ashley Hardaker, with contributions from Professor John Healey, was commissioned by Woodknowledge Wales to produce a set of practical guidance notes introducing the economic aspects of woodland creation to farmers and landowners. The guidance notes are a component of the Home Grown Homes Project which aimed to identify transformative actions for local supply chains of timber in Wales. The six linked notes provide an overview of simple economic tools that farmers and landowners can use to do some preliminary calculations and assess if investing in timber production on their farm might make financial sense prior to reaching out for specialist advice. The guidance notes in English and in Welsh can be found on the Woodknowledge Wales Website.



COMPLETED PhD PROJECTS 2020 & 2021

We have a fantastic community of postgraduate students conducting research linked to the many and varied forestry@bangor specialisms. Below is a list of all the PhD projects that have been submitted and passed since the previous forestry@bangor newsletter was published. PhD students are the heart and soul of a wide range of forestry@bangor research activities – many of the articles linked to in the overview of our research (see earlier section compiled by Professor John Healey) refer to the outputs of these projects.

Author	Title	Date	Supervisor(s)
Atucha Zamkova, A.	Studying the frost tolerance of Sitka spruce (*Picea sitchensis* [Bong.] Carr.)	2021	Dr Andy Smith
Buenavista, D.	Co-production of knowledge with Indigenous peoples for UN Sustainable Development Goals (SDGs): Higaonon Food Ethnobotany, and a discovery of a new Begonia species in Mindanao, Philippines	2021	Professor Morag McDonald and Dr Eefke Mollee
Diggens, M.	Identification, Ecology and Function of Armillaria species on oak trees in the Forest of Dean	2020	Professor James McDonald
Gittins, H.	Can a woodland activity programme benefit participant wellbeing and change the way they use woods?	2021	Dr Sophie Wynne-Jones and Dr Norman Dandy
Greer, B.	Aboveground biomass of a South West Florida mangrove stand	2020	Dr Nat Fenner
Hardaker, A.	Enhancing ecosystem service provision in the Welsh uplands - the role of increasing tree cover	2021	Dr Tim Pagella and Dr Mark Rayment
Magessa, K.	Exploring the mismatch between policy objectives and outcomes in Participatory Forest Management in Tanzania	2020	Dr Neal Hockley and Dr Sophie Wynne-Jones
Nguyen, M. P.	Analysis of Options by Context for Scaling Agroforestry in Northwest Vietnam	2020	Dr Fergus Sinclair and Dr Tim Pagella
Peters, T.	Understanding the role of plant-microbe symbiosis in the cycling of carbon in temperate forest ecosystems	2020	Dr Andy Smith
Webb, B.	Investigating the impact of trees and hedgerows on landscape hydrology	2021	Dr Andy Smith

GENEROUS DONATIONS TO FORESTRY@BANGOR

Nander Robertson, President of the Royal Scottish Forestry Society wrote to the Vice Chancellor in late 2020, explaining that the seminal text "Tall Trees, Small Woodlands" by Professor Bill Mutch had been updated and reprinted. The letter most generously offered to provide a copy of the textbook to each and every one of our students, to commemorate 100 years of the Forestry Commission. Special thanks are due to Dr Mark Rayment, Senior Lecturer in Forestry, who undertook the huge task of liaising with each and every student: this involved organising the postage and packing of over 110 packages and the disbursement of a total of over 150 books.

A few quotes from students who received a copy of the book are copied below:

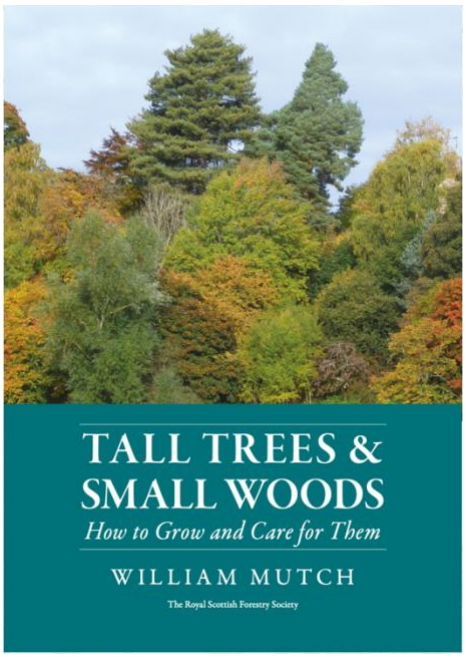
"*Just received my copy of Tall Trees and Small Woods. What a great book, full of extremely useful information for a forestry student....and future woodland owner (hopefully). A very generous gift.*" Tasha

"*I received my copy the other day. I must say I'm very impressed - a very comprehensive overview of forestry with some great diagrams and images. I was never going to turn down a free book but I think I'll be using this one regularly as a reference. Please convey my thanks to the RSFS!*" Jack

"*I would like to thank the RSFS for such a wonderful and generous gift. I love that it has so much up to date information covering such a wide range of topics all in one book, even an ID guide! This will be very handy. It already has pride of place on my bookcase. It was a very uplifting and motivating gift receive*." Anna

"*Please do pass on my thanks for this kind gift - it looks like a terrific resource. If the contents list is anything to go by, it looks admirably accessible. It's proving a welcome distraction from considering the fragmentation of the international forest regime complex*." Adam

"*I've been looking through the 'Tall Trees and Small Woods' book you gave us last week and I wanted say thanks! Looks like a great starting point on the degree and is already proving very useful! Please pass on my thanks to the Scottish forestry society for the much-appreciated gift*." Ben.



Alan Pottinger, Executive Director of the Commonwealth Forestry Association, very kindly donated two copies of the recently published textbook "Achieving Sustainable Management of Tropical Forests", edited by Dr Jürgen Blaser and Pat Hardcastle (valued at nearly £400). We've no doubt that it's been well used by current students, particularly as the University library now has a very user-friendly 'click and collect' service!

Since the previous newsletter (2020), forestry@bangor has also received two generous cash donations that will enhance the learning experiences of current students. Ken McNamara (MSc Forestry distance learning) donated more £7,500, to be used to support the forestry programmes including for research, equipment, exceptional items, library materials, software and assisting students from any country.
Will Baxter completed his MSc Forestry (distance learning) programme in 2021. He thoroughly enjoyed his studies and on receipt of his results, kindly made a donation of £500, to be used to assist students with their forestry dissertation projects.

We plan to feature stories written by recipients of these funds in future newsletters. If you'd like to make a donation to support the foresters of the future, then do get in touch. Information about how to donate can be found here https://www.bangor.ac.uk/giving/how-to-give - but make sure if you want to give funds specifically to support forestry, it's best to get in touch first.

Cronfa Bangor
The Bangor Fund

BANGOR COLLEGE CHINA

By Tim Pagella, Arbi Sarkissian and Mykola Kutia

For those not familiar with the novel college, Bangor College China (BCC) is a joint venture formally initiated in 2014 between Bangor University (BU) and the Central South University of Forestry and Technology (CSUFT) located in Changsha, the capital city of Hunan Province, China. BCC's Forestry and Environmental Management (FEM) programme has made some remarkable achievements since its humble beginnings. The programme began with 18 students as its first cohort and has graduated a total of 36 since then, with a significant number awarded first class honours. It currently has 86 students enrolled and is expected to enroll approximately 30 students on average each year. The increase is largely due to BCC expanding beyond Hunan Province, allowing more students to apply from different parts of China. The FEM programme is not only expected to expand with new staff and educational resources, but also more opportunities for exchange between BU and BCC.

Bangor College China's FEM is a unique programme taught by foreign experts and CSUFT faculty who together have helped to shape and facilitate a truly international forestry learning experience for Chinese students. The course combines a one-year English Language course with a further three years studying both temperate and tropical forest systems. Students also have the option to come to Bangor as part of their studies. As in Bangor, lectures are supported by a range of practical activities in the subtropical biomes around Hunan. These field practicals are perhaps the most exciting and rewarding attributes of the FEM programme, culminating in two weeks at CSUFT's Lutou Experimental Forest Farm in the first two years of study. Third year students then gain theoretical and practical knowledge of integrated forest and catchment management at the Jiumu Forest Reserve in the outskirts of Changsha. Following this, third year students spend 10 days at the Dongting Lake Field Station where they determine how modern management practices of woodland mosaics in wetland habitats are impacted by broader land-use systems. Many third year students are also undertaking incredibly exciting and state-of-the-art research for their Honours Projects, which has propelled some of them into top universities both in China and elsewhere.

Despite the extraordinary challenges faced during Covid-19 in 2020 (Hunan is adjacent to Wuhan province), the FEM programme has continued to attract increasing numbers of students. As mentioned above, FEM initiated its first graduating cohort of 18 students in 2019, followed by eight in 2020, and 12 in 2021. Many of our students have gone on to pursue postgraduate studies in forestry-related programmes in the UK and Europe (e.g., at University College and Imperial College London, and University of Freiburg) as well as in China (e.g., Beijing School of Forestry, University of Hong Kong).

Several alumni have remarked that their learning experiences at BCC were instrumental in shaping their academic pathways, especially those who went abroad. BCC also aims to facilitate transfers in the other direction, providing an exciting opportunity for BU's forestry students to gain a unique and rewarding learning experience in China. There's no shortage of great food and magnificent landscapes to visit, not to mention the warm hospitality of the Chinese, and a chance to learn some Mandarin while helping students here improve their English skills. 欢迎大家!

Top: Management Plan fieldwork, Xiangtan near Changsha (November 2018)
Bottom: Dendrology practical at Lutou Forest Farm (May 2021)

IMAGES:

Top: FEM's first graduating class (June 2019)

Middle left: Jiumu Forest Reserve field excursion (October 2019)

Middle right: Inventory practical on CSUFT campus (December 2021)

Bottom: Lutou Forest Farm dormitory (May 2021)

STUDENT PRIZES AND AWARDS: RFS BANGOR BURSARY

Roll of Honours for the 'Royal Forestry Society (RFS) 'Bangor Bursary' for the best final year 'forestry project'

2004	Christopher Guest	**2013**	Daryl Hughes
2005	Clive Ellis	**2014**	Tim Peters
2006	Andrew Smith	**2015**	Byron Braithwaite
2007	Ikuyo Ishikawa	**2016**	Robert Turner
2008	Simon Morath	**2017**	Felix Gregory
2009	Sebastian Nehve-Rogers	**2018**	Zac Blow
2010	Marc Brouard	**2019**	John Trimble
2011	Sam Brown	**2020**	George Dennison
2012	Amy Lotay	**2021**	Karen Batten

2020 – George Dennison

George Dennison submitted an excellent final year dissertation as part of his ICF accredited MFor Forestry degree. In recognition of his outstanding submission, he was presented with the RFS Bangor Bursary by Simon Miller MICFor of the North Wales Division during a live online event for forestry finalists on 1st July 2020. His research involved a combination of field work and GIS analysis and modelling. He investigated the presence of natural tree regeneration with common gorse patches at a number of sites in north-west Wales and used his results to help predict where natural tree regeneration was most likely to occur in common gorse habitats. His examiners were in unanimous agreement that his research is of publishable quality, in particular given the current societal interest in increasing woodland cover. George graduated with a first class degree after five years of study, which included an International Experience year at the University of British Columbia, Canada and two years as President of the Bangor Forestry Students' Association.

2021 – Karen Batten

Our nomination for the 2021 RFS Bangor Bursary was Karen Batten, for her project on the early growth of Scots pine on a restock site in Cornwall. Karen investigated the effects of soil fertility, soil pH and vegetation abundance on the size of trees four growing seasons after planting. Her results showed that soil pH accounted for the most variation in diameter of young trees, followed by total vegetation biomass. Her study highlights how the effects of soil pH should be considered when managing sites to optimise the early growth of Scots pine, though further research is needed to confirm the exact management required.

Commenting on her excellent dissertation, Professor of Forest Sciences John Healey wrote: "*The original, carefully developed, project plan was severely compromised by Covid-19 restrictions. Karen was not able to carry out the originally planned field work in North Wales, or the range of planned lab analyses. She was commendably determined and organised to take all the necessary steps to enable her to carry out a reduced field and lab project during late summer 2020 and into the 2020-21 academic year to salvage some of the original scientific plan and learning experience of the project, as best she could."*
"At all stages she took the initiative, and led the interaction with her supervisor in a professional and commendable way."
"This dissertation is an outstanding achievement given the severe constraints that so limited the empirical work that could be carried out for this project. Karen really has obtained high value from the material that she had. She completed this dissertation under conditions of high pressure and stress and deserves huge credit for her achievement."

Karen attended a Royal Forestry Society field meeting on 1st July 2021 at Llandegla forest, where she was presented with her prize by Divisional Chairman John Roe (image: left)

Karen started work on 5th July 2021 with Fountains Forestry in the south of England. She says that she'll be gaining experience in "estate forest management and woodland creation as well as many other things", and we wish her every success in the future.

Student Prizes and Awards: ICF Best Student Award

Roll of Honours for the Institute of Chartered Foresters (ICF) 'Best Student Award'

2009	Anthony Pigott	**2016**	Sam Huddleston
2010	William Malcolm	**2017**	Samantha Howard
2011	Scott Jackson	**2018**	Gabriel Hibberd
2012	Richard Belcher	**2019**	John Trimble
2013	Joseph White	**2020**	Yaseen Esprit
2014	Joanna Jervis	**2021**	Sam Rowley
2015	Robert Evans		

We are very grateful for the continued support of the Institute of Chartered Foresters for running their 'Best Student Award', which is given to the student who shows the greatest improvement in their grades between 2nd year and final year. Winners receive a years' worth of annual membership of the ICF at Associate level, which is significantly more valuable than annual student membership.

Student Prizes and Awards: Mary Sutherland Award

Roll of Honours for the Mary Sutherland Award for the 'best female undergraduate student on one of the forestry programmes'

2016	No award (*no female finalists*)
2017	Samantha Howard
2018	Elinor Dobie
2019	Jemima Letts
2020	Sarah Ellis
2021	Catherine Pearson

Mary Sutherland was the first female forestry graduate in the world in 1916 which was of course at a time of great suffering and social change during the First World War. She went on to a distinguished forestry career and her memory is very much still alive today, including the publication of a biography celebrating her life just last year. The Mary Sutherland Award was launched by Professor Morag McDonald in 2016 to celebrate the 100th anniversary of Mary Sutherland's graduation. It is presented to the best female forestry graduate each year.
James Walmsley, Senior Lecturer in Forestry was asked to write a few words about Sarah Ellis, the 2020 award winner, to be read out at the online event for finalists.

"*Your contributions to Bangor University during your studies with us have been outstanding. You worked tirelessly at Treborth Botanic Gardens and as a peer guide, inspiring open day visitors to come and follow in your footsteps. Your BFSA presidency saw a huge range of impressive activity, including the first even joint BFSA – Royal Forestry Society guest lecture. You also acted as the first ever student ambassador for Woodland Heritage which included organising two fantastic guest lectures, including one in partnership with the Institute for the Study of Welsh Estates, and another one in partnership with the Continuous Cover Forestry Group. It's very likely you are one of very few Bangor University students to have attended a garden party at Buckingham Palace! On behalf of Professor Morag McDonald, I'm delighted to present you with the Mary Sutherland Award for 2020.*"

Sarah also took some time out during her studies to visit New Zealand, where she travelled extensively, and made a pilgrimage to the spectacular grove of redwoods that were planted in memory of Mary Sutherland.

The 2021 winner was Catherine Pearson (right). On receiving the award, Catherine wrote "*Following my graduation with a First Class Honours degree in Forestry, I have been honoured further by receiving the Mary Sutherland Award as the best female forestry graduate in the class of 2021. I have had the time of my life at Bangor University and I am pleased that my hard work has been recognised, my thanks to all the SNS staff, my friends and colleagues, and all the women in forestry who came before me*."

During her studies at Bangor, Catherine Pearson invested a huge amount of energy, thought and care into the University community. She worked as a peer guide to support new students during their first weeks and months in Bangor. She also helped out at University open days, showing prospective students and parents around, answering their many and varied questions, providing reassurance and inspiration. She was also an active member of the BFSA committee during 2020-21, helping the president to maintain activity and positivity during the lockdowns.

Student prizes and awards: Peter Henry Award

Peter Henry graduated in BSc Forestry from Bangor University in 1948, and enjoyed a highly distinguished career as a Forestry Advisor for the UK Overseas Development Administration (now the Department for International Development). He has a particular interest in tropical dry forests, and the **award is made to the student who gains the highest mark for a dissertation relevant to dry forest research**. The winner in 2020 was Patience Olesu-Adjei, studying MSc Tropical Forestry (distance learning) for her dissertation entitled "Cocoa Production in Ghana: A Comparative Analysis of The Impact of Adverse Climate on The Yields of Cocoa Produced Under Shade and Full Sun Systems". Patience was a Commonwealth Scholarship Commission Distance Learning scholar.

Patience, on learning of her award, responded "*I am truly delighted to hear from you again and especially with this great news. I am truly honoured to win such a prize. Please extend my sincerest appreciation to the teaching team at the School of Natural Sciences and to Peter Henry for me.*"
On receiving a copy of the dissertation, Peter Henry wrote "*I have read the dissertation with considerable interest. It is a well-researched and soundly compiled study which should prove useful towards decisions on cocoa production in Ghana. I would be grateful if my congratulations on the Dissertation and her MSc could please be passed on to Mrs Olesu-Adeji.*"

Student prizes and awards: Phil Johnson Memorial Award

Phil Johnson worked for Tilhill for many years and was Regional Manager for England and Wales when he passed away following a short but valiant battle against cancer eight years ago. During his career he made a huge contribution to the company and forestry alike, including setting up the UK's largest privately owned mountain bike centre at Coed Llandegla, Wales.
As part of the company's work to strengthen links with students, Tilhill offers awards to top performing forestry students at leading universities which offer degrees in Forestry. The Phil Johnson Memorial Award was set up in 2015 and is awarded to the best performing student on the MSc module in Silviculture, which students on the various postgraduate forestry@bangor programmes complete.

Roll of Honours for the Phil Johnson Memorial Award

2015	Patrick Duffy
2016	Mary Crossland
2017	Harry Thomas
2018	Maaike Felstead
2019	Ed Lewis
2020	Cameron Pellet
2021	Chris Rawlinson

2020 – Cameron Pellet

Cameron was presented with the Award in a unique 'online first' in the summer of 2020, which you can view here.

Upon learning of his success, Cameron wrote: "Thank you David (Edwards, Tilhill Forestry) for presenting me with this award. I feel honoured, especially considering the calibre of my peers. It came as a huge surprise to hear I had won, and I am really grateful to Tilhill for supporting it.

"I am also thankful to all the forestry lecturers at Bangor University for the exceptional education I received. Just seeing the improvements I made over the duration of the silviculture module have shocked me to no end. The module culminated in a final essay on silviculture in a changing world. The topic I selected was chosen after a conversation with Sam Brown, one of Tilhill's forest managers, and also a graduate of Bangor University. The largest problem he could foresee in British forestry was pests and disease —specifically, the green spruce aphid and the large pine weevil. So, I explored how these two pests were going to be influenced by the changing climate over the next 100 years, and how this will influence the growth of the UK's dominant timber species —Sitka Spruce. This really characterises what I enjoyed about silviculture, all scientific disciplines have a focus, or model species —for my BSc in Biotechnology, that was the Agrobacterium, but what is unique about silviculture is the duration of time that comes into play with a focus on trees.

"After my undergraduate degree I spent a year working and living in India. It was there I was first exposed to forestry and where I realised my passion for forests could perform a role in society. So, upon returning home to Kent, I started looking for forestry courses, and after a unique philosophical conversation with Mark Rayment one of my lecturers, I was sold on studying there."

James Walmsley and Mark Rayment, Senior Lecturers in Forestry and MSc forestry@bangor Programme Directors added: “In typically modest style, when Cameron was informed that he had earned the highest overall mark in Bangor University’s MSc Silviculture module, and therefore had won the Phil Johnson Memorial Award for Silviculture, he said that he must have “got lucky” in the group work component (on the economics of thinning practices). Even if this were the case, it’s a truism to say that people create their own luck. Besides which, luck had nothing to do with the excellent work Cameron produced looking at the potential of species mixtures in UK upland settings.

Like the Award’s namesake, Phil Johnson, Cameron is an innovator and in what little spare time his MSc studies allow, he also worked on a relascope-based rangefinder for increasing the efficiency of the k-tree plot method of rapid forest inventory. Cameron readily adjusted to the COVID-induced curtailment of fieldwork for his practically-based dissertation, in which he worked on developing an improved statistical model of national forest cover for both deforesting and afforesting nations. His work should be a reminder that although forest cover is still declining globally, a resurgence of interest in forests and forestry means that many countries are experiencing a period of net afforestation, and now is an excellent time to embark on a career in Forestry.”

Above: L-R David Edwards, James Walmsley, Chris Rawlinson

2021 – Chris Rawlinson

Despite the challenges presented by the global pandemic during much of his registration at Bangor University, Chris was able to fully engage remotely with his studies, which included live lectures, seminars, small group activities, online workshops and virtual field work. Within 8 months of registering on the programme, he was successful in gaining an industry role as an Assistant Ecologist, conducting survey work and assisting with the creation of forest management plans.

Upon receiving the Award, Chris said: “I would like to thank Tilhill for sponsoring this award and David for presenting me with the trophy. It’s a great honour to win this year’s award. I very much enjoyed working with my course mates, bouncing ideas off each other and bringing different skills and ideas to the table: I’m sure the award could have gone to any number of us.
“I would also like to thank James Walmsley, Mark Rayment and all of the forestry related staff within the School of Natural Sciences. They have gone above and beyond this year to ensure that students have not missed out on opportunities, despite the changing Covid situation. I for one know that my forestry knowledge has developed greatly over the MSc programme, and it has been great to be within a department full of energy and a sense of community.”

James Walmsley, Senior Lecturer in Forestry at Bangor University, was also fortunate to attend the prize giving event He said: “Chris performed exceptionally well on the silviculture module, submitting an excellent critical essay on silvicultural options for the Afan Valley in South Wales in the face of a changing climate. We have also nominated him for this award because he was exemplary in his attitude and engagement. Despite the challenges of studying remotely due to the pandemic, he actively participated in all online events, asking questions, helping other students and helping to create and sustain a positive learning environment for all. He also took on the role of ‘student representative’, acting on behalf of his fellow students in the Student-Staff Liaison Committee. We’ve no doubt that Chris will make innovative and creative contributions to forestry and the wider community in his career, in a manner that the Award’s namesake, Phil Johnson, would greatly approve.”

BANGOR FORESTRY STUDENTS' ASSOCIATION (BFSA)

Academic year 2020-2021

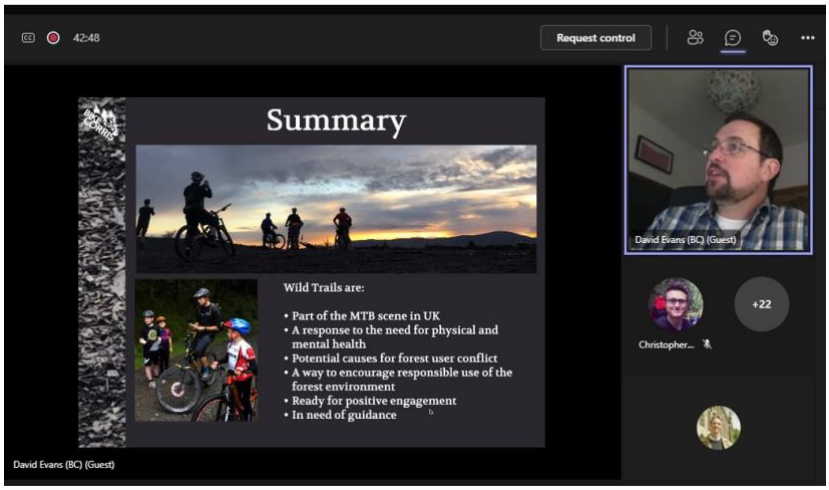
This particular academic year was a challenge for us all, given the severe restrictions on face-to-face interaction. Yet under the leadership of Andjela Pavlovic (President 2020-2021), BFSA took full advantage of the circumstances to hold a series of live online 'Teams' events, with guest speakers including:

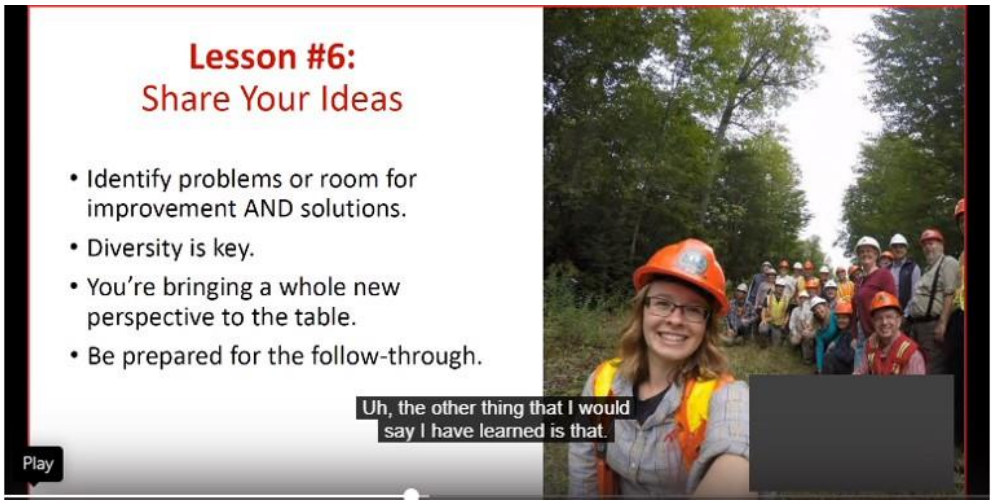
- Geraint Richards MVO FICFor, Head Forester at the Duchy of Cornwall and Shireen Chambers MBE FICFor, Executive Director at the Institute of Chartered Foresters (Image: Below left)
- Lacey Rose, Co-Founder of Women in Wood (who joined live from Canada) (Image: Bottom)
- Berglind Karlsdóttir, Social Research Scientist at Forest Research

These events were very well attended and greatly helped forestry@bangor students to retain a sense of community and contact during a very difficult period for students and staff alike.

Academic year 2021-2022

Possibly for the first time ever, some of BFSA's committee members this year are distance learning students! Due to the ongoing Covid situation, BFSA has continued to run live events online and it's been great to see a good number of distance learning, international and master's students attend these, as well as students in Bangor. In the autumn of 2021, BFSA hosted several excellent talks covering very different aspects of forestry, ranging from topics including the latest forest management mapping software to the challenging issue of unsanctioned mountain bike trails appearing in forests (Image: Below right)! As always, it's been great to welcome back some Bangor alumni as guest speakers.
Under the leadership of President Lamorna Richards, the BFSA committee has been working hard to establish links with different companies, charities, and individuals to develop areas of mutual future benefit. BFSA has a very busy second semester planned for spring 2022 and the committee are very much looking forward to hosting another great line-up of speakers.





MEET THE BFSA COMMITTEE 2021-2022

President: Lamorna Richards

Hey, I'm Lamorna and I'm the BFSA president for the academic year 2021-22. I've just had a placement year with Natural Resources Wales and I'm not enjoying being back in sunny Bangor for the final year of my BSc Forestry degree. BFSA is a great way of meeting other forestry students as well as individuals and organisations working in the forestry sector, and it would be great to see some new faces joining this year. If you want to know more about BFSA or get involved, then feel free to send me a message or email lmr18nzj@bangor.ac.uk.

International Opportunities Officer: Chris Horwood

Hi! I'm the international opportunities officer in the BFSA team for this year. I've spent some decades working overseas in Asia and Africa mainly working on development and aid programmes with governments, the UN and NGOs. I'm making a shift into forestry rather late on in my life but hope to leverage my overseas experience and interests to work in international forestry after graduation. As such I hope to be well placed to act as the channel for overseas opportunities, conferences, and linkages to major organisations in forestry overseas – especially the International Forestry Student's Association (IFSA) based in Germany. I hope to offer updates and links through the year on things of interest internationally and of course you are welcome to contact me anytime with questions via chh20gtg@bangor.ac.uk

Treasurer: James Macintyre

Hey everyone, I'm James. I'm a final year BSc Conservation with Forestry student and I'm the treasurer for BFSA this year. I hope that my contribution to the society can be getting the different years and cohorts of forestry students interacting and getting to know each other more as well as – of course - taking good care of BFSA funds!

Secretary: Chris Rawlinson

Shwmae, su'mae, hello. I'm Chris and I'm the Secretary of the society.
If you've got an interest in trees, forests and maybe even developing a career in these fields then in my – albeit slightly biased opinion – joining the BFSA is a no brainer!

As Secretary I'll be documenting committee meetings; communicating with potential guest speakers and industrial links; helping with the general running of the society; and letting members know what the BFSA is up to.

A little bit about me: I'm on the MSc Environmental Forestry course, I work part-time as an Assistant Ecologist for a forestry consultancy, I like bikes and chainsaws, my favourite tree species is Douglas fir and my favourite cider is Old Rosie.

I'm lucky enough to live and work in Mid Wales and the Shropshire Borders, but rest assured I'll be working tirelessly behind the scenes to make your society is as good as it can possibly be!

chr20gts@bangor.ac.uk if you need to get hold of me. Iechyd da / good health!

POSTGRADUATE RESEARCH COLLABORATION WITH INDUSTRY PROFESSIONALS

Opportunities to get that much needed ‘foot in the door’ combined with real, practical experience is something that many aspiring foresters covet. Our postgraduate dissertation module helps to facilitate working partnerships with industry professionals and individual landowners on mutually beneficial research projects. Through our existing partnerships, students gain access to sites, resources and/or expertise, make connections within the industry and further their careers and skills. Meanwhile, collaborators have a chance to see their ‘nice to do’ projects come to fruition for little additional cost, make connections with up-and-coming talent and gain access to additional skills and expertise.

There are far too many of these collaborations to describe here, so we have chosen the following as an example. Jim Wright, graduating MSc Forestry (distance learning) student of 2021, liked the work of UK charity, The Carbon Community, and set about assisting them with progressing a research project that they already had in motion: a woodland creation project and experiment in mid Wales.

Jim and colleagues from The Carbon Community investigated the role of soil mycorrhizal inoculant and basalt amendments on early growth of newly planted trees (Rowan, Oak, Birch & Cherry). Jim was also given the opportunity to design his own trials, enabling him to trial different doses of the amendments and their influence on different tree species.

Jim said of the experience, “*having the chance to get involved in a real experimental trial, and engage with leading scientists from the UK and beyond, was a real privilege and really helped me with my motivation, learning and self-confidence*” Charles Nicholls, Co-founder and trustee of The Carbon Community, commented that working with Jim and other Bangor University students had been “*really positive*” – both recommended other students take full advantage of future opportunities to get involved.

To help facilitate further partnerships, as well as providing dissertation students with documentation specific to potential projects, students will in future have the chance to attend live online events with existing collaborators to promote research project opportunities. If you have research projects you would like to work on with Forestry@Bangor students, please contact Dr Bid Webb.

Images © Jim Wright

DAVID KINLOCH AND FORESTRY TEACHING AT UCNW: 1956 - 1960

By Martyn Baguley, BSc Forestry, 1960

Between 1956 and 1960 David Kinloch taught forest management and economics at the then-called University College of North Wales (UCNW – now Bangor University). He had graduated in forestry from Edinburgh University in the 1930s. 'Taught' is probably too loose a word! He was a lovely man but no lecturer. Management was based on Brasnett's book, Planned Management of Forests. It basically set out all the classical French and German management systems with the emphasis on sustained yield (not the concept of sustainability we use today) and natural regeneration which we spent a lot of time seeing during a 3 week tour in France in 1959 when we visited the beech forests of Compiegne and the silver fir forests of the Ardennes. This whetted my appetite for the concept of the 'normal' forest, hardly achievable in the UK but I set out to achieve it for International Thomson, my employers in the 1980s, in North America. Sadly they pulled out of forestry too soon for me to meet my desired objective.

Above: *On a visit to Bangor in 2016 are from L-R: James Walmsley, Martyn Baguley with his wife and Jon Burke, BSc Forestry 2018*

Economics was based on Hiley's 'The Economics of Plantations'. In the 1950s, so soon after WW2 , forest economics wasn't considered to be very important. State foresters in the UK were only concerned with expanding the forest resource and private forestry was driven by the Schedule D and B tax incentives offered to forestry investors. Usually there was only one question on economics in the Honours exams and that almost invariably required the examinee to quote the Faustmann Formula. No need to know that now with Excel discounting models (*eds note: use of Excel for this purpose now features in the 2nd and final years of the BSc programmes as well as in the MSc programmes*). David Kinloch did his best to cover the subject but we all thought that he didn't understand it himself! If you had told me then that some 30 years later I would be teaching forest economics to post graduate students at the University of Edinburgh and acting for HM Government in a Scottish Court Land Tribunal case to determine how much compensation a Scottish landowner was entitled to, due to not being allowed to afforest hundreds of hectares of Aberdeenshire land due to it being an SSSI I would never have believed it! (The court hearing lasted a week and resulted in the compensation paid to the landowner being reduced by about £1million – I was having chemotherapy at the time!).

David Kinloch was much better at teaching bridge! He, together with Professor Mobbs, accompanied students on the 3 week French tour (they both spoke some pigeon French) and whilst we trundled the length and breadth of France David taught some of us the card game in the back of the coach. He and his wife were very proficient at the game, a necessary attribute for colonial foresters in those days.

Notwithstanding my criticisms, I have always felt a great debt of gratitude to what is now the Bangor University School of Natural Sciences. The subject of forestry, and the way it is taught, is totally different now from the way it was done 60 years ago, but the 4 years I spent at UCNW, apart from being wonderfully enjoyable, gave me a grounding in, and love of, the subject that has lasted me a lifetime, taken me all over the world and bring up a family.

Thank you Bangor!

Martyn Baguley

Above*:* The class of 1960 is pictured here on a tour of the Forest of Dean

A Brief Summary of Careers of the BSc Forestry Graduates of 1960

Collated by W J C (Bill) Blight, with further notes added by Martyn Baguley. Bill and Martyn accept responsibility for any inaccuracies or errors!

Surname, First name	From	Career / notes
Adekunle, Arthur Olodutin	West Nigeria	Returned to West Nigeria as an ACF (Assistant Conservator of Forests) and rose to senior positions in the Forest Service as well as in his tribe, achieving the title of 'Chief Adekunle'.
Afanyedey, Elias Koe	Ghana	Returned to Ghana to rise to number three in the Forest Service.
Andoh, Lawrence Isaac	Ghana	Bursar in University of Ghana
Allen, Peter	UK	Diploma in Conservation and Ecology. 1961 Weed Research Organisation, Oxford 1969 Agricultural, Horticultural and Forestry Training Board. 1971 Agricultural Training Board.
Annin-Bonsu, Berko	Ghana	*Unknown*
Baguley, Martyn	UK	Scottish Woodland Owners; Oakover Forest Services; Bowater UK Paper Co; Strutt & Parker; Economic Forestry Group; International Thomson; From 1994, Freelance International Consultancy.
Baines, Alan	South Africa	Returned to work in South Africa, retiring to live in Cape Town.
Baker, Bob (Robert)	UK	Worked as lecturer in environmental studies in South Wales, after briefly working for EFG in South West England.
Bentley, Jan	*Unknown*	*Unknown*
Blight, William (Bill)	UK	Joined Adekunle in West Nigeria for a 2 year tour. 4 months with Genetics Section – Forest Research, Alice Holt. 4 years with the New Zealand Forest Service. 1967 to 2019: forest management in South-West England.
Evans, Dai	Wales	Forestry Commission in Wales
Hall, Gavin	UK	Spent a year in America before joining Forest Products Research at Princes Risborough (later to become TRADA).
Holmes, Bob (Robert?)	UK	Joined Estate Agency in his home area of Coventry.
Perseram, David	Central S America	Believed to have returned to his home country – then British Honduras?
Ross, Michael	London	1962 Imperial Forestry Institute, Oxford Believed to have worked in SE Asia, but this may be confused with M L Ross of Los Angeles.
Taylor, David	UK	One tour in East Africa. Extensive experience in the management and finance of forests and land in the UK. Past-president of the ICF.

Forestry Department Staff, 1956 – 1960

Surname, First name	Title	Career / notes
Mobbs, Eric	Professor	After retiring, moved to New Zealand and met up with former student, Barry Keating in Napier.
Huggard, Eric	Lecturer	Forest surveying and engineering.
Owen, Tom	Lecturer	Silviculture
Kinloch, David	Lecturer	Forest management and economics
Sutherland, Steve	Lecturer	
Elliott, Geoff	Lecturer	Forest utilisation.

IN MEMORIAM

TONY FEARNSIDE

28/6/1934 – 18/4/2020

By Mac Jones and Janice Scarabottolo

(Minor editorial contributions: James Walmsley) December 2021

Anotony (Tony) was born in Bradford – the eldest of three children. Their father was in the Air Force which meant that during the children's childhood the family moved fairly frequently. By 1945 the family had returned to Bradford, and Tony attended Bradford Grammar (1945-1953). Tony's father had also been a pupil, and keeping up family tradition, his sister, younger than he was by one year, attended Bradford Girls' Grammar, and simultaneously his aunt, who was their father's very much younger sister. Apparently at that time, occasionally pupils from the Girls Grammar were allowed to attend folk dancing at the Boys Grammar School –with brother and sister dancing!

Since around the age of 14, Tony had decided that his life's work would be in forestry and at one school Speech Day, the speaker gave sound advice to the boys – to do their two years' National Service straight after school before university. Tony gained the necessary A-level passes to allow him to study forestry at University College of North Wales (Bangor) which he did after National Service with the Royal Army Service Corps in Singapore.

Tony studied Forestry at Bangor from 1955 to 1959, alongside 12 other aspiring Foresters who joined the same year. Thanks to the small group and many field courses they all became firm friends. Most of the Year managed to keep in contact and even managed to meet up occasionally after graduation. During his time in Bangor, Tony, with John Dolwin, bought an ex-GPO van ("Julie") at auction, for £50. "Julie" took John, Tony, Mac and others travelling far and wide, on courses and Rugby trips, until, returning from a Rugby Dinner in Beaumaris, Tony had a prang on the Menai Bridge, wrecking his knee. Julie had a watery grave in The Menai Straits.

During his final year in Bangor, an announcement which appeared on one of the University notice-boards came to his attention - for a forestry officer in South Australia. The description of the location made it seem like the south of France! He applied and was given the job.

Tony arrived in Penola, South Australia, in January 1960 to take up a post in the Woods and Forests Department, after an overnight train trip from Adelaide where he had disembarked from the three-week sea voyage from England – with a large trunk of books, a few clothes, a transistor radio and nearly enough money to last until pay day.

Mac Jones also headed for foreign lands after his graduation (Tanzania), but fortune brought them back together in 1963, for a stay at Mac's place in Huddersfield. Shortly after their return to Australia, Tony and Colleen, with their three children, were seconded to Kathmandu for a year or two. A holiday reunion was planned in Sussex, with John and Jean Dolwin. Sadly, Colleen died suddenly, but they still met and shared Tony's grief.

Tony later went to work in the Canberra region with ACT Forests and worked in the forestry sector for almost 60 years, including roles with the Food and Agriculture Organization of the United Nations. Various jobs and consultancies took him far and wide: to Nepal, Italy, Solomon Islands, Bhutan, China, Ethiopia, Papua New Guinea, and India. Tony also played 'Aussie Rules' Rugby for many years (in Bangor he was a powerful, First XV Second-row Forward!).

By the early 90s, Tony and Janice, whom he met in Rome, settled to their life-long relationship in Canberra - together until the end of his life in April 2020.

Mac exchanged letters, then emails and Christmas greetings regularly and met up with Tony again at a 2000 Bangor Reunion. They managed to get 9 of the original 13 back together. They stayed together in The Eryl Mor at Bangor Pier. Tony brought a bottle of superb Australian Port, which with the assembled toasted Bangor and all things Forestry!

Reflecting on the reunion of 2000, Mac Jones wrote: "*Since then, several of the 'starting 13' have passed to the 'Great Arboretum in the Sky ', but I'm sure if we all had our time again, every one of us would repeat those glorious 4 years before setting off to tend Forests all over the globe.*"

Tony was the Convenor/President of the Friends of the ACT Arboreta from 2003 – 2012. He was awarded the Medal of the Order of Australia (OAM) for service to the community in the ACT (Australian Capital Territory). In his modest way Tony said that such awards are not possible without the support and cooperation of many others. Tony was a member of the Theosophical Society from 1991 until the end of his life and was a former President of the Canberra Branch of that Society. When Tony was diagnosed with Parkinson's Disease in 2008 he joined Parkinson's ACT, becoming a committee member and bulletin editor until his health did not allow him to participate fully and share his knowledge and his enquiring mind. He endured various health ailments, including multiple myeloma, for many years with fortitude and determination. A summing up of Tony's life would be that he was a true Renaissance man. His aim was always to be of use and he had written in his end of life care plan:
"*I love you all – I hope that your world is somehow better from my achievements and that you will build on these.*"
R.I.P. Tony.

CAN FORESTS HELP PROVIDE NATURAL FLOOD MANAGEMENT IN WALES?

By Matt Cooper, PhD student and Dr Sopan Patil, Lecturer in Catchment Modelling

Matt Cooper, a KESS 2 East PhD student, and colleagues, recently published a review paper entitled 'Role of forested land for natural flood management in the UK: A Review' which explored the current state of research on the effectiveness of forests for providing natural flood management, specifically focusing on four types of woodlands (catchment, cross slope, floodplain and riparian). The main finding of this review was that although there is some evidence that carefully planned and managed woodland can mitigate flood risk, the published data for this evidence base is somewhat sparse.

To fill the gap in the evidence base, Matt is currently conducting a field study, in collaboration with Forest Research, at the Pennal catchment near Machynlleth (in mid-Wales) to characterise how woodlands intercept the rainfall and can slow down the rate of runoff towards the streams.

Whilst on the face of it this is a standard field study to determine the amount of throughfall and interception in different types of forests in a catchment (mature and immature coniferous, mature and immature mixed deciduous and more mature mixed deciduous), the study is breaking new ground in its use of the LoRaWAN technology to provide real-time measurements at a high frequency. In collaboration with Max Dickens, from Bangor's School of Computer Science and Electronic Engineering, Matt has developed an off-grid local wireless network in which the conventional rainfall gauges report their data in real time to a central data hub via the Internet of Things (IoT) and the mobile network.

Matt says: "This is the first study we can find utilising this technology in this way, but it also lends itself to a wider application. Almost any environmental sensor can be made with or retrofitted to include an IoT node which can connect to the gateways in the forest.

We are already working with a team from Exeter University and we are hoping to have another Bangor project utilising the network soon, which will aim to demonstrate the viability of monitoring VOC's emitted by trees in a real time environment."

A major advantage of the LoRaWAN network is that it enables remote real-time monitoring of the rainfall data in the study area, and the live dashboard also allows researchers to monitor the health of the instrumental setup.

Using this experimental data, Matt aims to develop a canopy interception model that: (a) accounts for different forest types, (b) can be scaled up to a catchment level, and (c) can be coupled with a soil hydrological model to provide scenario-based assessment of a forest's potential in providing natural flood management.

IMAGES:

Above: A cluster of rain gauges in a mature coniferous stand

Left: The Gateway device, which is entirely off-grid and receives rainfall data and transmits it to the Internet

MUSINGS AND MEMORIES OF FORESTRY@BANGOR ALUMNUS JAMES HEDLEY

(MSc Environmental Forestry, 1991)

It was autumn 1990 when I drove to Bangor in our Fiat 4x4 Panda to start my studies, newly engaged to Alice (the daughter of Peter Ormrod, a retired founder manager of Flintshire Woodlands, and forestry bigwig). I loved my time as a post-grad, both at SAFS (*School of Agricultural and Forest Sciences*) and out & about in the forests of Gwynedd. The MSc Environmental Forestry course was brilliant: a warp speed learning curve of nuanced eco-sensitive silviculture & arboriculture; not forgetting early era computer programming and a less welcome crash course into DCF (*discounted cash flows*) and IRR (*internal rate of return*) maths! Happy days!

A thesis in hand, a year later, was about sensitive sustainable management of historic and conservation grade wooded and parkland landscapes in Wales. The dream was to land a position with, say, the National Trust and work on the future plans for their estates.

Thwarted by blank faces, I concluded the MSc Environmental Forestry course was so far ahead of its time, that it was misunderstood by older 'monoculture manacled' managers, with regret.

So, I changed course taking the positives and eminently transferable computer and maths skills of the MSc course, to enter the world of finance and investment, at Liverpool. Some nearly 30 years later, I am an Investment Director at Rathbones, a top U.K. wealth management firm. I also became an Honorary Consul of Sweden some 20 years ago: and have since had the honour of a knighthood from HM The King of Sweden, bestowing on me: Knight Commander of the Royal Order of the Polar Star!

Alice and I have had four children and have resided in North Wales, since UCNW days. We have the good fortune of owning a small woodland by the river Dee: with a good mix of hard and softwoods, with the latter being thinned to enable the NR (*natural regeneration*) of the natives with ash and cherry being particularly fine. There is a beautiful stand of mature 100+ year old Corsican Pines as a feature.

James Hedley, August 2020

STUDENTS FUND NEW TEN-YEAR RELATIONSHIP BETWEEN BANGOR UNIVERSITY AND WOODLAND HERITAGE

By James Walmsley, Senior Lecturer in Forestry at Bangor University and WH Trustee

Woodland Heritage (WH) has been a fantastic supporter of Bangor University for much of this century, providing financial assistance to many forestry students, inspiring guest lectures (insert image "15. BFSA.jpg") as well as over £800,000 of funding for a string of important research projects focused on Acute Oak Decline.

Woodland Heritage has also provided invaluable mentoring, advice and assistance for students, alumni and staff, as well as guidance to prospective students and partners. This relationship is also of great benefit to Woodland Heritage: by working with Bangor University, it is able to meet many of its charitable objects, support and inspire the next generation of foresters, and deliver high quality research into tree pests and diseases.

There is, nonetheless, a tension between the long-term business of protecting, managing, conserving and creating forests and woodlands, which is at the heart of everything that Woodland Heritage does, and the short-term and unpredictable income from annual renewal of membership on which the charity relies.

Recognising this tension, James Walmsley, Woodland Heritage Trustee and Senior Lecturer at Bangor University came up with a plan to address this in relation to Bangor University's partnership with the charity: finding a way to fund a ten-year Premium Corporate Membership.

Clearly well out of the ordinary, there was no way such a membership could be funded by the University itself: it would create an impossible precedent given the huge number of partner organisations and charities that are associated with the University. So, James approached the Bangor Forestry Students' Association (BFSA) committee and put the idea to them. The response from Peter Roe, BFSA President 2019-2020 on behalf of the committee was hugely positive:

"*BFSA recognises the support that Bangor University students and alumni have received from Woodland Heritage over many years, including Garthwaite bursaries, subsidised places on the excellent Woodland to Workshop course, financial support for attendees of the SelectFor Irregular Silviculture training, and more. In particular, it's highly likely that the International Forestry Students' Association's highly successful conference, the Northern European Regional Meeting 2019, organised by BFSA, may not have happened without the incredible support and guidance of the Chief Executive, Guy Corbett-Marshall.*

"BFSA is delighted to be in a position to contribute £1250 towards this ten-year membership. The committee all agree it's an excellent investment in our wonderful relationship with Woodland Heritage."

Ken McNamara, a part-time distance learning student on the Bangor University MSc Forestry programme, had (in early 2020) made a very generous donation to the University of several thousand pounds, to be used to support the forestry programmes. So, James approached Ken, proposing that part of his donation be used to fund the remaining £1250 of the ten-year membership. Ken responded:

"*I think the proposition represents fantastic value and a really effective way to use part of my donation. It will clearly generate benefits for many years to come for my fellow forestry students and for forestry at Bangor University in general. I love it!*"

For Woodland Heritage, Guy Corbett-Marshall said: *"Working with the staff and students at Bangor University is always most rewarding, so it is wonderful that this new membership relationship will guarantee that continuing for another decade at least. We have achieved a lot together already to benefit forestry in such diverse ways long into the future, and now have the foundations in place to carry that momentum forward throughout the 2020s."*

Professor James McDonald who leads research into Acute Oak Decline at Bangor University said:

"*We are incredibly grateful to Woodland Heritage for their unwavering support of our efforts to understand the causes of Oak declines, which will hopefully inform management practices. This long-term collaboration has been fundamental in maintaining continuity within our research team, in training the next generation of forest pathologists, and enabling us to react more quickly to new challenges and scientific developments."*

Reflecting on this new relationship between BFSA, Bangor University and Woodland Heritage: a membership that runs up until 2029, James Walmsley said:

"A*t a time when there is so much uncertainty and budgets are generally so short-term, it's fantastic to formalise this long-term connection between Woodland Heritage and the University. The next generation of foresters will face many exciting challenges during their careers and this partnership will ensure they are able to continue learning from the invaluable experience of the members and partners of Woodland Heritage.*"

Further reading:

1. Euro students see Welsh forestry at its best: https://www.woodlandheritage.org/news/2019/4/24/euro-students-see-welsh-forestry-at-its-best (The Chief Executive of Woodland Heritage provided huge support to the students, as well as helping them secure sponsorship both from Woodland Heritage as well as third party organisations).

2. Report: 'Irregular Silviculture in the Lowlands: Transformation in Practice': The SelectFor course: https://www.bangor.ac.uk/natural-sciences/courses/distancelearning/documents/WHJournal2020DavidCracknell.pdf (Bangor University student David Cracknell's attendance was financed by a Woodland Heritage grant)

3. Irregular Silviculture: Transformation in Practice: https://www.bangor.ac.uk/natural-sciences/courses/distancelearning/documents/irregular-silviculture.pdf (three of the attendees who feature in this article were Bangor University students supported financially by Woodland Heritage)

4. Study Tour to Poland: https://www.bangor.ac.uk/natural-sciences/courses/distancelearning/documents/Poland.pdf (three of the attendees were Bangor University alumni or were current students at the time, and were supported financially by Woodland Heritage)

5. Woodland to Workshop short course: https://www.woodlandheritage.org/woodland-to-workshop (at least 15 Bangor University students and alumni have attended this excellent 3-day course since it first started running over a decade ago)

6. Bangor University, Forestry, Ghana and the Commonwealth. More in common than you might imagine: https://www.bangor.ac.uk/natural-sciences/courses/distancelearning/documents/WHJournal2020BangorUniGhanaStudyTour.pdf

7. Bangor Foresters at Buckingham Palace: https://www.bangor.ac.uk/news/archive/bangor-foresters-at-buckingham-palace-40829

Woodland Heritage Trustee and forestry@bangor alumnus Geraint Richards at a BFSA guest lecture, February 2020

GHOST FORESTS: BUILDING AN ARCHIVE OF TROPICAL FOREST DATA

By Jenny Wong, Honorary Lecturer, School of Natural Sciences

Many of us left Bangor clutching our new degrees and heading off to work in and explore the forests of the tropics. I was immensely privileged to be one of these – and in 1989 went off full of equal measures of trepidation and excitement to an ODA forest inventory project with the Ghana Forestry Department. Now 32 years later, I still dabble in forest inventory. Over that time, I've had a ringside seat as the forests I first met have shrunk, thinned out and become increasingly threatened. The forests of our youth may now be better represented in our memories than on the ground. Stories of change are moving and invaluable but it becomes something more powerful if this is backed by evidence. Old inventory data, in particular, can enable the new generation of foresters to better understand, monitor and model the forests they inherit from us and to shape the forests of the future.

To this end, I have been working with International Union of Forest Research Organizations (IUFRO) Working Party 4.02.01 "Resource Data in the Tropics". Under this banner we have initiated the search for legacy tropical forest data, still on paper or in older digital formats, along with various other information sources that are not readily available in electronic form. https://www.iufro.org/science/divisions/division-4/40000/40200/40201/

This then is a call out to any alumni who has worked in the tropics to contribute papers, reports, management plans, maps and data you may have in your possession. We are very grateful that the Archives at Bangor University Library have offered to provide a safe home for such materials. If you have any material to contribute please first contact Jenny Wong (jenny.wong@wildresources.co.uk) and Sheila Ward (tropfordata@gmail.com), and we will evaluate what you have and organise transfer to the archive.

Looking forward the IUFRO group is seeking funding to get these resources digitized and available to the global public.

KEEP IN TOUCH

https://www.bangor.ac.uk/natural-sciences/subject-areas/forestry/

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