



Morning bird surveys on Llara Farm, Narrabri

Image credit: [Michael Dahlem](#)

Edition 11, June 2023



Georgika

Georgika - an online newsletter for those interested in academic aspects of the Ag sector

From the Director

[Brent Kaiser](#)

Welcome to this edition of Georgika. SIA researchers have been busy during the first half of the year; we hope you enjoy reading the updates below.

On 28 March we held our annual RD Watt Lecture in the Great Hall. This year's theme was Sustainable Agriculture: Challenges and Opportunities Towards 2030. The lecture was well attended by an engaged audience with many questions for our speakers. The [recording](#) is available on our website in case you missed the lecture.

Building and enabling research capabilities in the Agriculture and Food sector is a cornerstone to SIA's DNA. Our university is rich in talent and diversified



skills, that generates a lush stream of outcomes that continue to benefit the Agriculture and Food sector, and directly the community we serve. I'm glad we have the capacity to meet the diets we desire and more broadly, benefit from the quality of lifestyles built on an ample supply of Agriculture and Food products. Nonetheless, Agriculture and Food continues to be a moving entity that cannot afford to be static or complacent. We must continue to achieve more!

Nothing more pressing now is the need to achieve greater sustainability across the sector to meet the global demands and principles now being set for the industry. As a sector, we are responsible for over a third of all global GHG emissions today ([Xu et al, 2021](#)), a figure expected to rise as food/fibre production responds to global demand from population growth, and the rise in economic wealth in highly populous regions around the world. Challenges lie ahead for the Agriculture and Food sectors, which are expected to maintain increased productivities, while being challenged with decaying capabilities (land, water, energy) to continue feeding the planet. Overlaying this is the imminent response to an increasing rationalisation of resources and human capacity required to make Agriculture and Food production systems grow.

Reimagining Agriculture and Food production systems will be a necessary exercise for the global sector to pursue. How do we produce the food and fibre demanded by society on a rationalised budget, where sustainability metrics (current ESGs) drive decisions and investments across all sectors. Do we understand how best to change practices that we have relied upon to meet a future GHG target of 10% or lower? A principled research strategy will be required to ensure this essential sector can continue to meet its expectations for years to come.

Events

Paddock to Pub, Camden

We're swapping the lecture theatre for the pub; come along to share knowledge, drinks and food. In this relaxed atmosphere, sit back and listen to short talks from three researchers and test your skills with Ag trivia questions.



Speakers:

[Associate Professor Cameron Clark](#)

DairyUp – a drink for after a night out...it's all about recovery.

[Associate Professor Sonia Liu](#)

Added Hormones?! Why chickens grow so fast?

[Dr Dominique Van der Saag](#)

Taking the headache out of dehorning.

Date: Wednesday 19 July 2023

Time: 6-8pm

Venue: Plough & Harrow, Camden

This is a free event, but registration is essential as tickets are limited.

[Register for Paddock to Pub, Camden](#)

Nitrogen 2023

SIA will be hosting the [Fifth International Symposium on the Nitrogen Nutrition of Plants \(Nitrogen 2023\)](#).

The international symposium will run from 6-9 November in the Refectory at Camperdown Campus. Nitrogen 2023 is a triennial meeting which was last held in Nanjing, China in 2019. It attracts a wide range of global researchers who study how plants manage their nitrogen requirements from soil acquisition, plant and microbe assimilation, tissue storage, and remobilisation to developing seeds. This year's meeting will have an overarching focus on sustainability and how best to manage N use in agriculture. The symposium will have a range of leading experts in the field who are changing what we know about plant N utilisation at a range of scales.



[Register for Nitrogen 2023](#)

Theme Leader Updates

Plant Breeding and Production

[Richard Trethowan](#)

Our Industrial Hemp Varieties Trial, funded by the AgriFutures Emerging Industries Program, is focused on the performance of different varieties of low THC industrial hemp from around the world. The trial is being carried out at nine sites across three climate zones of Australia including the University of Sydney's two trial sites at Narrabri, NSW and Stanthorpe, QLD. The objective is to provide Australian hemp growers with independent information about the performance of different varieties to provide recommendations about varieties and times of sowing across diverse geographic regions of Australia. A field day was held in February 2023, giving growers the opportunity to inspect the crop and learn more about the emerging industry. By improving access to regionally suitable varieties and knowledge amongst growers, this aims to establish industrial hemp as a profitable industry in Australia.



Figure 1: Guy Roth, Ed Chaplin & John Bateman with the low THC hemp trial in January 2023



Figure 2: One of the low THC industrial hemp varieties being trialled in January 2023



Figure 3: Low THC Hemp trial in January 2023



Figure 4: Soil probes used to record soil moisture and temperature for the Low THC Industrial Hemp Trial

John Deere Seeding Rate & Precision Weed Management Trial

We are carrying out a Precision Planting Cotton Trial in partnership with John Deere which is trialing a number of innovative and novel approaches to precision planting as well as using different pressures and depths for planting. The effects of this on emergence and plant density are then being assessed using data gathered both in-field and via drones (Fig. 1 below).



Figure 1: John Deere Cotton Trial crop at different growth stages - December 2022 (Top Row), January 2023 (Bottom Left) & April 2023 (Bottom Right)

Our partnership with John Deere also involves a spot spraying precision weed management trial using their 'See and Spray' technology with the first spray applications carried out in January 2023. John Deere are contributing their 'See and Spray' equipment as their contribution to the project

activity (Fig. 2 below).

We have two trial sites (Llara & Edgeroi) and are determining the efficacy of the spot sprayer by counting the number of weeds present prior to each spray as well as the species and growth stage of the weeds. We are then re-counting the weeds following spraying to determine the efficacy. This technology brings natural resource management and environmental benefits by reducing herbicide and chemical use by 60-90%. The aim of this trial is to demonstrate to growers and farmers the benefits of the system to improve uptake and adoption.



Figure 2: John Deere See & Spray Technology for Precision Weed Management being used for the weed assessment trial – February 2023

Kenaf Trial

The Kenaf program run by Brent Kaiser and Madalyn Paull is getting going with a breeding program with some small variety trials based out of Camden and a bulk seed trial based out of Narrabri. The Kenaf trials are looking at two primary outcomes; identification of lines adapted for Australian

conditions and post-harvest seed protein and oil extraction with the transformation into value added into foods. Our investor is looking for fibre for energy use and the possible opportunities for carbon sequestration.



Figure 2: Kenaf in full flower – April 2023



Figure 3: Aerial photo of Kenaf trial at Narrabri – April 2023

[Read further about Plant Breeding and Production](#)

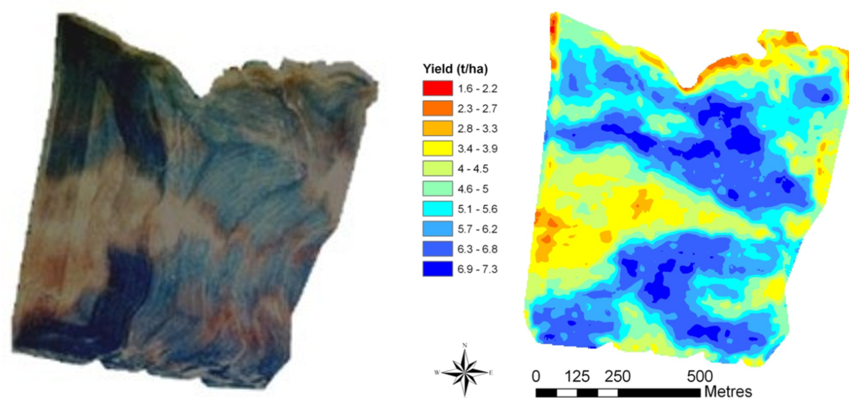
Digital Agriculture

[Tom Bishop](#)

End of an era

This update is a bit different as in March 2023, Brett Whelan, Associate Professor in Precision Agriculture left the university to begin his next adventure. Brett completed the first PhD in Precision Agriculture (PA) in Australia in 1998 at the University of Sydney and has been with us ever since. He led the Precision Agriculture Laboratory at the University of Sydney which was established in 1995. For Digital Agriculture within the university and Australia this truly is the end of an era.

His PhD was in the discovery phase of PA where grain yield monitors were just being commercially released and research was needed to develop approaches to process and map the data, as shown in the wheat yield map below from a farm near Moree in 1996. This was the focus of his PhD and quantifying the yield variability and its controllers. In the example below soil type is a clear driver of yield and illustrates the need for site-specific crop management.



Post-PhD he pioneered the concept of management zones, which involved partitioning fields into regions that were managed differently. In the figure above a starting point would be to manage the “brown” and “grey” soil differently. Last year I went on a farm tour of the Eyre Peninsula in South Australia and most of the growers were doing zonal management as business as usual. In terms of research impact, if we scale this across the many farms in Australia, the impact of this research is inconceivable.

Brett continued to do more research and educate generations of agronomy students at the University of Sydney but I am not sure many people know that he has been organising and running the Australasian Precision Agriculture Symposium every year since 1997. This is a long time as shown by the photo below of the audience at the first one. To think I thought we were so stylishly dressed in the 1990s!



Today it is co-badged between the Precision Agriculture Laboratory and the Society of Precision Agriculture for Australia. To me it is a rare meeting format that has a mix of growers, consultants, industry and researchers. I always return from it feeling more energised with a sense of purpose, largely due to the presence of non-researchers in the attendance list.

Thank you Brett and best of luck in the future.

[Read further about Digital Agriculture](#)

Animal Agriculture

Cameron Clark

Each year I have the pleasure of being a member of the organising committee team for the [Dairy Research Foundation Symposium](#) Chaired by Prof Yani Garcia. This year's theme is 'A lot more than just CARBON' highlighting what can be done to address future pressures related to **Cows, Adaptation, Risks, Business, Opportunities and New research**. Presenters will include a mix of national and international researchers, farmers and service providers talking to the very latest trends, news and research. The 2023 Dairy Symposium will be held at The University of Sydney's Camden Campus (Liz Kernohan Conference Centre) on Tuesday 7th and Wednesday 8th November (Corstorphine Dairy) keeping the popular 2-day format with a Conference Day followed by the DRF

Dinner, and a Field Day on day 2 comprising our inspiring Emerging Scientist Competition. I look forward to seeing you all at this year's Symposium and registration is now open ([register here](#))!

Cutting across many of our 2023 Symposium's themes are the societal expectations for high standards of animal welfare. In our livestock industries, surgical husbandry procedures such as removal of horns in cattle are routinely performed on a large scale for reasons related to management and production. This animal agriculture update spotlights the work of Dr Dominique Van der Saag, Lecturer in Animal Welfare Science and Animal Behaviour with the Sydney School of Veterinary Science and a member of the Sydney Institute of Agriculture.

[Dr Dominique Van der Saag](#) update:

It is great to be back, updating you all on my research journey since 2021 (my last update). That update focused on my work that is improving pain treatment of livestock using novel methods of pain measurement and new therapeutics, particularly for long term analgesia. This project has now been completed and it is fantastic to share some of the key findings from this work with you. Ear-tag based accelerometers (linked to work from a parallel programme on objective measures of welfare led by Cameron and Dr Sabrina Lomax) revealed for the first time the temporal behavioural changes for cattle in response to acute and long-lasting pain. From this, a modified release injectable formulation of meloxicam was shown to extend the putative duration of action of the drug to better align with duration of pain experienced. As a novel, practical alternative we showed the addition of meloxicam to feed to similarly increase the time that potential analgesia could occur. I have now built on these exciting findings to now lead a new research programme exploring novel wound treatments for the dehorning of cattle funded by Meat and Livestock Australia.

Dehorning of cattle not only is painful, but can lead to excessive haemorrhage, infection, flystrike and delayed wound healing and as such, there is a need for specialised wound repair treatments that are not only effective, but also easy, safe and inexpensive for farmers to use. This project will take a multi-disciplinary approach to develop and test specialised materials to stop bleeding and protect and repair dehorning wounds in cattle, through collaborations with USYD's Weiss Lab at the Charles Perkins Centre (Weiss Lab - Charles Perkins Centre (sydney.edu.au), UNSW's Graduate School of Biomedical Engineering (School of Biomedical Engineering | Engineering - UNSW Sydney) and USYD's Nepean Clinical School, Department of Critical Care (Nepean Clinical School research - Faculty of Medicine and Health (sydney.edu.au)).



[Read further about Animal Agriculture](#)

Urban Agriculture

[Floris Van Ogtrop](#)

I would like to start by acknowledging all those who attended and were involved in presenting and organising the SIA Annual Research Case – Urban Agriculture. Recordings of the event can be found [here](#). I'd also like to congratulate our poster winners Romainul, Joseph, and Arushi at the event.

I'd like to give a shout out to St. Helen's Garden, who also presented at our showcase, and point you to their [web page](#) which gives a wonderful snapshot of the regular workings of a productive community garden in the heart of Sydney both now and historically.

At around the same time as the symposium openAI stunned the world and launched chatGPT on November 30th. I decided to ask chatGPT about the challenges facing urban agriculture in the next decade. The challenges included land availability, water scarcity, access to capital and resources, soil quality and regulatory challenges. While generic, I think that it does reasonably well in identifying key issues we are facing in growing produce in our urban centres as well as challenges some of our high-tech growers.

I'd like to draw your attention to the water scarcity challenge and point you to [recent research](#) that SIA researchers have completed looking at how effective staircase wetlands (Figure 1) are at filtering greywater (showers, baths, hand basins, and washing machines) (Qadir et al. 2023).

Given that 50-80% of household wastewater is greywater, this is a considerably underutilised resource that can be used for plant production both in the wetlands and also downstream plant production using the filtered water (Vertical farms, community gardens,...). Dr. Vanessa Pino has indicated that a follow up article will be looking at filtering blackwater (toilet and kitchen sink). Look forward to that one.

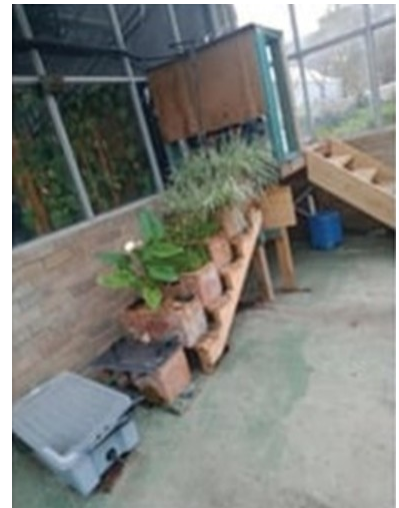


Figure 1. Staircase wetland (Qadir et al. 2023)

I'd like to finish up with a fascinating meeting with Phil Pettit from the Royal Botanic Gardens, Peter Fox and Luke Rogers from Greenspace and Dr. Claudia Keitel from SIA. Much of the conversation was around growing Australian native foods in vertical farms. While I can't find the statistics, I seem to remember Uncle Bruce Pascoe, well known writer of *Bunurong* and *Yuin Heritage*, stating that only around 3-5% of the native food industries are Indigenous-run and owned. [Other sources](#) put this figure at between 1-10%. Phil highlighted the importance of involving Aboriginal run and owned organisations in such operations for example through supplying seeds and downstream value adding as well as by providing flexible employment opportunities. It was great to learn about Phil's experience working in this space.

This year we have Masters of Agriculture and Environment student Tiffany who will be creating a digital soil map of Pocket City Farms. She will be trying to identify why some locations on the farm are not performing well and whether these are soil related.

We also have honours student Maddy who will be building on Arushi's research and explore light and nutrient conditions that improve nutrition in different microgreens. She is using newly acquired Koray lights which have 4 tuneable channels and include a UVA channel at 400nm that claims to increase plant active ingredients, dwarf plants, and improve plant morphology. All important aspects when growing plants in tight spaces that require to look good and be highly nutritious.

PhD Student Oscar has started analysis data coming in from his first experiment which involved both aerobic and anaerobic digestion of different food waste products. He is currently comparing nutrient yields of the final product and will also extract DNA from the samples to compare the microbiome of each of the extracts.

Read further about Urban Agriculture

Quality Food

[Tom Roberts](#)

In a [2020 report](#) by the Australian Government Department of Agriculture, Fisheries and Forestry with ABARES, it was concluded that the level of food security in Australia is one of the highest in the world, up with Canada, Germany and France. Australia ranked equal 1st for lowest levels of undernourishment and 7th in the world in food affordability.

More than 70% of the total value of our agricultural production is exported. This includes 71% of our wheat and 75% of our beef and veal, not to mention 86% of our sugar. Our exports act as a shock absorber, keeping the supply of food to the domestic market stable.

Australia imports only about 11% of our food, made up of 9.6% imported processed food and beverages, and 1.6% imported fresh food and beverages.

Now Australians are trying to deal with a combination of high inflation (7.0% in the March quarter), high interest rates and high rents. These and other cost-of-living pressures, including increasing costs of fruits and vegetables, have meant that more Australians are experiencing mild to moderate food insecurity.

The ABS Consumer Price Index showed that for the March quarter, the price of dairy and related products increased by an annual rate of 14.9%, and bread and cereals by 11.8%!

Government and the agri-food industry need to work together to provide food security for all Australians. Meanwhile, work by many members of the SIA continues to contribute to increasing the security and sustainability of food production in Australia.

The contribution below was written by Dr Joy Becker, Associate Professor in Aquatic Animal Health and Production. Joy's research focusses on increasing the sustainability and biosecurity of fisheries and aquaculture through better understanding of fish pathogens and the diseases they cause.

Aquaculture and fisheries in Australia

Fish and aquatic species are vital human food providing essential nutrients. Ensuring a safe and affordable supply of fish is critical to global food and nutrition security. It will also help us meet the challenge of feeding 10 billion people by 2050.

In many developing countries like Sri Lanka, Bangladesh, Indonesia, fish contributes ~55% of the total animal protein in diets. This contrasts with Australia where fish only contributes 10% of our animal protein. The Australian fisheries sector is now valued at \$3.1 billion which is up 9% from the decade prior. In 2021, Australian aquaculture has for the first time surpassed wild fisheries in value climbing to \$1.74 billion (ABARES). Our most commonly farmed commodities are Atlantic salmon,

southern bluefin tuna, oysters, prawns, and barramundi.

All our major aquaculture industries are reliant on ocean-based culture for at least part of production. Australia's marine environment is changing faster than at any other period in recorded history. Today's prediction for our main aquaculture growing areas is that over the next 100 years, ocean temperatures will rise another 1-2°C in the north and 2 to 5°C in the south. Climatic changes including ocean warming and acidification and changes to ocean current patterns will have direct impact on our future aquaculture growth by shifting the availability of food resources and habitat and fluctuations in species distributions. Climate change may also bring increased risks for fish and human health with changing the abundance and virulence of pathogens (e.g., faster growth rates of pathogenic marine bacteria) or the susceptibility of the host to pathogens and infections (e.g., incidence of parasites and food-borne viruses).

The key challenge for policy makers and development agents will be to create an enabling environment for development of the Australian aquaculture and fisheries industries to meet the demand for aquatic food balanced with Australia being a world leader for biodiversity and ocean stewardship.



Figure 2. Market in Sri Lanka selling a mix of wild-caught and farmed fish (a); Ocean-based aquaculture systems use sea cages (b) for growing high value fish species like salmon or barramundi or more often aquaculture farms consist of estuary ponds (c) for growing fish and prawns.

[Read further about Quality Food](#)

Carbon, Water and Soil

[Federico Maggi](#) and [Claudia Keitel](#)

The 27th United Nations Climate Change Conference (COP27) was held in Egypt in November 2022. Budiman Minasny was in attendance and has reflected on the meaning of this conference for

agriculture, global challenges of soil, water and food security, and the rise of importance for regenerative agriculture.

COP27 and Agriculture: A big outcome of the COP27 was the establishment of the “loss and damage” international fund to support countries impacted by climate change, but it fell short on cutting carbon emissions. Sharm el-Sheikh, a Las-Vegas-type resort town, was probably not the most sustainable place for such a conference. The conference venue, located next to a golf course, was packed with delegates from different countries, activists and youths concerned about climate change. Unfortunately, there was also lots of greenwashing from various energy companies and plantations that claimed to be sustainable. Nevertheless, Food and Agriculture has become a major part of the discussion: an Adaptation and Agriculture day was held, and for the first time, four pavilions dedicated to Food Systems were present at COP27. It is well known that agriculture and land use change contribute to a quarter of global GHG emissions. In particular, and most problematically, emissions from livestock contribute to a third of global methane emissions. Nevertheless, agriculture can also be a sink of carbon through “Adaptation through [Nature-Based Solutions](#)”.

Koronivia joint work on agriculture: The Koronivia Joint Work on Agriculture (KJWA) started at COP23 in 2017 which recognised the importance of including agriculture as part of addressing climate change challenges. At COP27, the outcomes of 4 years of workshops were presented, and future work decided for the [next 4 years](#). This decision is aimed at addressing the impact of climate change to food security and the limited progress which has been made to implement the UN Sustainable Development Goals. The management of soil and water security was considered country-specific, and the decision document contains fairly broad statements such as: “... Recognised that issues relating to soil carbon, soil health and soil fertility, as well as sustainable soil and integrated water management, are context-specific and, taking into account countries’ circumstances, should be dealt with in a holistic and inclusive manner to realise the full potential of increased productivity in contributing to food security, adaptation and adaptation co-benefits as well as enhancing carbon sinks;...Further recognised that soil and nutrient management practices and the optimal use of nutrients, including organic fertiliser and enhanced manure management, lie at the core of climate-resilient, sustainable food production systems and can contribute to global food security;”. It is nevertheless positive that agriculture is acknowledged and “...Urges parties, relevant organisations and other groups to increase their efforts in relation to promoting sustainable agriculture, including by strengthening the role of indigenous peoples and local communities, and particularly women and youth, with a view to eradicating hunger and poverty while ensuring food security.”

Regenerative Agriculture: Regenerative Agriculture was touted as the solution to climate change! According to Climate Champions: “COP 27 is also an opportunity to reset our relationship with nature. Nature Based Solutions, including regenerative agriculture, have a central role in countries’ NDCs and national adaptation plans. Regenerative agriculture and NbS have a critical role to play in food and agricultural systems, able to sequester 10GT CO₂eq per year, make land use net zero by 2030, and a 10GT CO₂eq carbon sink by 2030, with benefits for biodiversity and livelihoods.” Although it is unclear how the number of 10GT CO₂eq per year was obtained, regenerative agriculture and soil health (despite being poorly defined and narrow) have gained a lot of attention. A network of global food companies, the Sustainable Markets Initiative, released a report on [Scaling Regen Ag](#), and the [Rockefeller Foundation](#) announced US\$11 million in grants to ten organisations to scale up Indigenous and regenerative agriculture practices around the world. Although various concepts such as conservation agriculture, indigenous agriculture and biodynamics attract attention

due to the dire need for agriculture solutions, they are loosely defined and mixed up to some degree. Rather than following the trend, it is time to set it clear. Here we'd like to share [our definition](#) of regenerative agriculture: "Any system of crop and/or livestock production that, through natural complexity and with respect to its contextual capacity, increases the quality of the product and the availability of the resources agriculture depends upon; soil, water, biota, renewable energy and human endeavour."

Carbon Farming: On another front, the Carbon farming initiative which started in Australia more than a decade ago has now found its way into the EU. The European Commission is about to set standards for certifying carbon farming activities— agricultural practices that increase soil carbon. Of course, the method will not be as detailed or as robust as what has been done in Australia. The EU is still uncertain about how to create a soil carbon market, according to the [news](#): "Once a carbon removal is certified according to the criteria laid out by the Commission, it will be up to member states how farmers will be remunerated for it – through public or private carbon markets, through funding schemes, or not at all."

The Future: Agriculture in the world is now realising that we can't simply practice business as usual. On the other hand, we should also not fall into the trap of alternative farming. As a scientific community, we invite contributions to the strategy of Digital Regenerative Agriculture. We have such a project recently funded by Cotton RDC. This allows for much wider cross-disciplinary collaboration and could be an excellent vehicle to bring several SIA groups together – soil, crops, livestock, hydrology, ecology, social science, one health, and engineering – across the University farms. Reducing greenhouse gases from livestock is a particular challenge as is realising carbon balance on farm.

Finally, I'd like to share with you some powerful images from Ukraine's pavilion at COP27.



Global maps of 173 crop commodities: In order to feed the planet and meet the Sustainable Development Goals of the UN set in 2015, it is important to measure the extent of sustainability in agriculture. In this context, Federico Maggi has been involved in providing maps of the distribution of crops worldwide:

There is currently a lot of research being conducted to quantify the productivity and sustainability of agriculture, not only in Australia but worldwide. This is driven by the concerns around food security under several environmental, social, and economic constraints. Nevertheless, the quantification of sustainability in agriculture has faced limitations including - quite surprisingly - the lack of recent data describing what crops are cultivated and where, geographically. The only comprehensive dataset available to date has been the pioneering work by [Monfreda, Ramankutty, and Foley in 2008](#), which refers to the year 2000. This means in practice that there is a knowledge gap of 20 years on where

and what crops are grown worldwide. More recent data have been gathered, but mainly focussing on some major crops.

To address this limitation, a recent effort was undertaken by the Sydney Institute of Agriculture and the School of Civil Engineering at the University of Sydney, in collaboration with the University of New England and the United Nations, Food and Agriculture Organization. The Research Team has produced an update to the original dataset released in 2008. This dataset (CROPGRIDS) is a comprehensive set of 173 crops and spans the globe. This new knowledge will be able to support analyses in all disciplines where current knowledge of the geography of crop commodities is required, including in economy, agricultural production, food and fibre supply and trading, climate change adaptation, land use and food security. The dataset is publicly accessible under [CC BY 4.0 International](#) and is described in the preprint article accessible [here](#).

Read further about Carbon, Water and Food

Development Agriculture

Daniel Tan

Visit by Chinese Shandong Innovation Group on 10 May 2023

I hosted a delegation of 11 people from the Chinese Shandong Innovation Group including Mr Zhang Chen, General Manager of Shandong Shanke Industrial Development Research Institute Co., Ltd. Mr Cheng Guang, Deputy General Manager, Shandong Scitech Innovation Group Co., Ltd, Mr Jiang Shijie, Deputy General Manager, Shandong Shanke Industrial Park Development Co., Ltd and Ms Hu Chao, Assistant General Manager, Shandong Science and Technology Consulting Center Co., Ltd., on 10 May 2023. The Shandong Province has the third largest science and technology innovation hub in China (the largest is in Guangdong Province). The group toured the facilities of the University of Sydney and the Australian Technology Park, South Eveleigh and discussed the start-up ecosystems in China and Australia.



[Associate Professor Joy Becker](#) will provide an update on her Department of Foreign Affairs and Trade (DFAT) funded project in Sri Lanka.

Sustainable marine aquaculture development for Sri Lanka

Fish and aquatic species play a vital role in global food security by providing nearly 17% of animal protein eaten by people. In Asia, despite great progress in the last five years, Southern Asia, which includes Sri Lanka is the subregion with the highest prevalence of undernourished people. In Sri Lanka, it is estimated that 9% or approximately 2 million people are undernourished. Though the island is blessed with some of the world's most significant environmental assets, aquaculture

development in Sri Lanka has been lagging behind global peers.

The global aim of our project is to support and promote sustainable marine aquaculture development in Sri Lanka. Aquaculture provides safe and affordable nutritious food, is a creator of employment and a generator of income and economic growth – especially in rural communities. Lead by Associate Professor Dr Joy Becker, the project is funded by the Department of Foreign Affairs and Trade (DFAT) and is in collaboration with the Sri Lankan Ministry of Fisheries, the Ocean University of Sri Lanka, University of Western Australia and NSW Department of Primary Industries Fisheries. At the end of the project, we will create a ‘road map’ that will identify priority site locations for marine aquaculture development in context with the identified priority list of aquatic species.

We are bringing world class knowledge and experience to accelerate aquaculture development at the industry level as well across multiple value chains (e.g., seaweeds, oysters, Asian sea bass aka barramundi!). Promoting sustainable marine aquaculture development in Sri Lanka will lead to improved food security through more affordable and safe food, as well as create employment and income opportunities particularly for rural economies and women.



Figure 1: A women's farming group in Northern province growing seaweed. Changes in the local climate patterns with excess rain and wind are a concern for the farmers and may be related to the “ice ice” disease that negatively effects the farms. Long term industry sustainability needs research and training to support this developing area of aquaculture.



Figure 2: Photos of Asian seabass or barramundi (*Lates calcarifer*) farming in Eastern province. Sustainable aquaculture practices do not rely on the feeding of low value ‘trash fish’ diets. Access to a sufficient supply of affordable aquafeeds is a key part of a long-term sustainable industry.



Figure 3: (a) Ms. LalitaKapur, Deputy High Commissioner to Sri Lanka presenting an acknowledgement of project award to Associate Professor Joy Becker (USYD), Professor Charitha Pattiaratchi (Univ. of Western Australia) and Dr Wayne O'Connor (NSW DPI Fisheries). (b) This is a collaborative project with partners from Sri Lankan and Australian universities, governmental agencies and the private sector.



Figure 4: Community workshop to discuss the opportunities and threats associated with marine aquaculture development with a group of sea cucumber farmers in Illupaikadavai, Sri Lanka.

[Read further about Development Agriculture](#)

Alumni

Scott Graham

I graduated from BScAgr (Hons) in 2006. After finishing at USYD, I undertook a Graduate Diploma of Education through Wesley Institute and have been teaching Agriculture and Science at Barker College in Sydney since 2010. Over that time, we have re-positioned Agriculture as a subject and sector to be seen within the school community as a science and business-based subject, which has academic credibility, significant number of jobs and meaningful challenges which students can look ahead to see themselves spending their careers on. I was honoured to receive the Prime Minister's Prize for Excellence in Science Teaching in Secondary Schools in 2021 for what we have done with Agriculture. I am currently undertaking a PhD part-time through CSU Wagga Wagga in addition to being Head of Agriculture at Barker College. My PhD work is in increasing the number of metropolitan secondary students studying Agriculture and following on the agriculture-related university degrees given there is around 5 jobs per university graduate from these degrees.

Agriculture is facing a historically dire situation in terms of enrolments as a secondary level and follow-on to agriculture-related degrees at universities. In NSW, only 1,500 students sit the HSC for Agriculture each year, which has decreased from around 2,500 in 1990, despite the NSW population more than doubling over that same time period. Nationally, there are only ~600 graduates from agriculture-related university degrees, meaning there are about 5 jobs per graduate. However there is significant untapped interest in Agriculture, as we have witnessed at Barker College amongst metropolitan students. Over a decade, we have gone from 100 students studying Agriculture from years 9-12, to now having 420 across the same cohorts at Barker. Students are interested in a career that has significant job opportunities, but also in an area where they can make a difference, is future focused and many are interested in an area with a technology focus. Agriculture as a sector is something that offers all of these opportunities and much more. As a sector, we need to do a better job at promoting a modern image of agriculture, with accurate career paths showing all types of roles in the sector, including off-farm roles and urban / metropolitan pathways.



New Degrees in Agricultural Science

The University of Sydney will be launching new degrees in Agricultural Science, available to students from Semester 1, 2024. Our new Agricultural Science degrees will focus on developing highly specialised knowledge across the major scientific, technological and economic drivers in agricultural practice, to ensure our graduates continue to lead the way in transforming agriculture.

Bachelor of Agricultural Science

This 3-year degree is an ideal course for students who want to acquire a broad and coherent understanding of agricultural science and its role in sustainable production and global food security. Across the Camperdown and Camden campuses, students will study a range of subjects, including introductory agricultural science, biology, animal management, agronomy, agricultural economics and business, agricultural markets, statistics and data analysis, genetics, plant protection, biotechnology and digital agriculture. Alongside these core subjects, students will further specialise by selecting one of eight cognate majors in areas such as agricultural economics, animal production, food science and soil science and hydrology.

Bachelor of Agricultural Science Honours

This 4-year degree builds on the Bachelor of Agricultural Science with the addition of an Honours research project that will deepen students' understanding of the big challenges and opportunities facing agriculture. During the final year of study, students will also complete a professional development unit, to further develop work-ready skills, and two new units in Agricultural Systems at the Narrabri campus.

<https://www.sydney.edu.au/science/>

Social Media

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