Yuwaya Ngarra -li Briefing Paper:

Sustaining the Walgett Aboriginal Medical Service Community Garden

2022

By Niall Earle

Executive summary

Improving food and water security in Walgett has been a long-term priority for the Yuwaya Ngarra-li (YN) partnership between the Dharriwaa Elders Group and UNSW. Since 2019, UNSW staff and students including from the Impact Engineering program have been involved in the rejuvenation of the Walgett Aboriginal Medical Service (WAMS) community garden, which had been badly affected by drought and water restrictions.

Building and sustaining a thriving community garden requires substantial planning, decision-making, management, and day-to-day activities. With all of this the WAMS community garden is on its way to becoming a space for cultivating connections, building skills, and producing fresh and healthy food.

The focus placed by the YN partnership on the WAMS community garden has produced tangible results. From early iterations of wicking beds to the current 50-bed layout, it has drawn on the skills and expertise of stakeholders in Walgett and at UNSW. A community led approach has been crucial to shaping the 0 Tw ( )0f. [illegible]

Contents

Statement of purpose

This briefing paper is intended to document what it takes to build and sustain a thriving community garden. By documenting a history of the rebuilt WAMS community garden and the involvement of various stakeholders, it outlines the elements that culminated in 50 productive wicking beds. It then looks to the future to ask what it takes to sustain and build resilience in the garden so that it can continue to thrive. The ultimate aim is to create a welcoming intergenerational learning space that is able to consistently deliver fresh fruit and vegetables to the Walgett community.

Set in the context of building food security, the WAMS community garden is one way resilience can be built through food knowledge and practice. Importantly, a well-functioning community garden becomes much more than a place just to grow food. The literature review included in this briefing paper helps outline the range of health and well-being benefits community gardens offer, as spaces for more than just growing fresh food.

This briefing paper is intended for use by YN, the DEG and WAMS to use, add to, and refine as a framework best suited to the garden's longevity. Additionally, the learnings can be used by other communities, organisations, or funders engaged and interested in the process and effectiveness of the WAMS community garden. The hope is that any of the lessons learnt can be applied elsewhere.

Situating the garden: context

In response to community concerns about food and water security in Walgett, the Yuwaya Ngarra-li Food Forum w

Trialling the use of wicking beds in the WAMS community garden

With the effects of drought in mind and working closely with long-term gardener Sophia Byers and other WAMS staff, the Impact team quickly identified wicking beds as a suitable, well-tested technology. Wicking beds store water in below-soil reservoirs, and through capillary action suck water up and into the soil when needed. The result is that in long periods of no rain and hot summers, water in the topsoil is not as easily evaporated and lost – giving the plants the sustenance they need to survive. Having chosen to explore the viability of wicking beds, the project became a collaborative process as trialling started.

Initially the project sought to re-use the old garden beds. In February 2019 the first iteration of garden beds were installed. Using the pre-existing beds, new soil was put in, and the beds were raised over a

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Embedding and refining the use of wicking beds

Once there was good evidence that demonstrated what would work longer-term, WAMS were able to commit staff and resources to developing and sustaining the garden and begin identifying clients who could benefit from receiving produce. In 2020, plans in the community garden became centred around scaling up in line with the additional personnel and identified need in the community. This meant seeking additional funding through the Yuwaya Ngarra-li partnership, the Global Water Institute and the NSW Government[1]. Once secured, the next steps were ordering 50 wicking beds from BioFilta, arranging delivery to Walgett, and working with DEG and WAMS to set them up.

In 2020, after a series of cross faculty meetings Impact Engineers were involved in – the WAMS community garden project became approved to be taught as part of Lucy Marshall's ENGG1000 course. This cemented the value of Impact Engineers as a student-led initiative that could inspire new engineering students to engage with the discipline of humanitarian engineering – using their hard skills in socially beneficial ways. More than this, it represents an encouraging embrace of community-led approaches that engage and work with Indigenous communities to advance their development goals. Successful follow-ups in 2021 and 2022 offer a continuum of refinement and an easy-to-apply channel for students developing an interest in the project.

The big surprise of the year was the outbreak of COVID-19 and adjusting to a new way of operating. This was a dynamic time, where UNSW collaborators had to react quickly so that they could continue to support the embedding of the wicking beds in the community garden remotely. During this stage weekly/fortnightly meetings were held via videoconference and ongoing correspondence between UNSW and Walgett stakeholders helped the project remain collaborative, and allowed a constant feedback loop between what was needed in the garden, and what could be done remotely during the COVID-19 restrictions.

In July 2020, the Impact and UNSW team were able to get together in the UNSW Makerspace for a bed build day. This was an opportunity to get hands on, and document exactly how the wicking beds needed to be constructed once delivered.

Ongoing monitoring and evaluation

In 2021, with 50 beds already installed, WAMS, DEG, and UNSW wanted to ensure their longevity and full functioning in the community garden. Initially Impact Engineers were working on a plan for setting up a hydroponic system in the new shed. A hydroponic system offered a way of running an in-garden nursery, growing new vegetable seedlings in water efficient ways before transferring them to the garden beds – with the benefit of reducing the cost of new seeds. With further research it was learnt a hydroponic process was both energy intensive (er)-6.3 ua.1 (6s)-8.1 ( )45i19.735 ghiv i wprl6sarith s bef6sie oceu3.

To-date data on water use

Water consumption data was first initiated with the wicking beds delivered in September 2019. This was through the log sheets delivered to measure water usage and soil moisture. Unfortunately, any results collected have not been stored.

Collection of water consumption data in WAMS community garden was re-initiated in May 2021 with the delivery of smart flow meters. When attached to a tap and hose, smart flow meters measure the litres of water used in a single garden session. Over time, collection of this data allows more certainty around garden water requirements. It is contingent on active recording by garden personal after a gardening session. It is also important that the garden personal/user finds the data log sheet easy to use. So far, no recorded data on water usage has been delivered by UNSW7 (i)3.2 (s)-8.1 ( )-.5 (r)-0.6 (i)-8.m ri om

method (Raes 2009), can be used to calculate the reference ETo. Using the climate data for Walgett taken from BoM and the evapotranspiration rate of a reference surface these calculations have been included as a reference in the rainfall table. The greater the difference between ETo and measured rainfall, the greater the need for well-

The department of primary industries has developed useful metrics for mapping and understanding drought. This includes classifications of drought as intense drought, drought, drought affected (intensifying), drought affected (weakening), recovering, and non-drought (DPI 2021a). Based on these

Garden output data and regular data gathering

Garden metrics

This section is intended for the development of future best practice around data collection in the garden. Each garden metric has an accompanying data log sheet to be filled in by using the appropriate equipment to take measurements/readings. The equipment can be stored with the log sheets in the garden shed. The data log-sheets are based on amount of sessions in the garden, and once they are complete, taking a photo of them is sufficient to be sent back to UNSW (more information on data-logging is found below). Each subheading below is hyperlinked to its data log sheet.

Data metric	Equipment used	Reason for measurement
Water consumption		

Table 8.1: Garden metrics and equipment

Water consumption

Planting data

This records the planting cycles; when things are planted, and in which beds they are grown. This is useful for keeping track of what is grown where for crop rotation and companion planting purposes and can be used with crop yield data to determine how successful certain plants are.

Frequency of measurement: When crops are planted / after they have harves ted

Crop yield

This is an important output metric, measuring the overall crop production of the garden. Over time this allows better understanding of garden productivity which can offer better preparation for fruit and veg box delivery as well as providing an indication of problems to be addressed should productivity start to decline.

Frequency of measurement: When crops are harvested.

Compost (temperature, volume)

Temperature : This is important as an overall check of the compost health.

Volume : Measuring the amount of compost by volume or weight allows calculation of the waste diverted from landfill, and subsequently an estimate of the greenhouse gases saved.

More on compost development can be round in section 9.1.

Frequency of measurement : Temperature (once fortnightly), Volume (whenever new compost is added).

Recommendations

This section outlines steps needed to improve productivity and viability of the garden. Understanding what builds and sustains the garden is important to ensuring its longevity – and will help protect against drought. As crops are dependent on water and nutrients it is important to develop practices attuned to recognising their needs and replenishing them. The Biofilta wicking bed is an irrigation solution suited to surviving droughts. Keeping soil healthy is less impacted by droughts, however, it is an important factor in maintaining garden productivity. With the basic needs covered, more creative endeavours can follow that expand the garden in exciting and unconventional ways.

Developing a compost system

The importance of compost

A functioning compost system is part of a healthy garden. It produces important nutrients that can be put back into the soil and prevents harmful greenhouse gases from entering the atmosphere by breaking down organic waste (Haug 2018). Importantly, it is a way of ensuring soil remains healthy without needing to buy new soil. After a productive summer or harvest, the nutrients taken out with the fresh fruit and vegetables can be replenished with compost produced at the garden.

Using compost

As a rule of thumb, compost should be added at end of each growing season, or about every 6-months. Nutrients should be replenished before things are replanted otherwise there will be a drop in plant productivity (Diaz et al. 2011).

When harvesting the crops, any plant matter that will not be eaten should be put into the compost. When turning the wicking bed soil, residual root mass should be pulled out for the compost. Once crops have been harvested it is appropriate to add compost. If no compost is available, then manure, blood and bone, store bought compost, or premium soil mix can be used instead. It should be spread across the wicking bed and mixed into the soil.

Making a healthy compost

Caring for compost is essential to its overall health. It is helpful thinking of a compost as a habitat for microbes. Choosing a good location is important – somewhere wheelbarrow accessible as well as somewhere shady. This way loads of compost can be easily transported to garden beds and the water does not easily evaporate.

A healthy compost can take about three weeks to make once started. It depends on a balance between brown and green waste, to produce conditions that effectively break down organic matter. The rule of thumb is keeping a volume ratio between brown and green waste of about 40:60. Brown waste is carbon heavy, and green waste is nitrogen heavy. Partnerships with local businesses can enable the use of

their organic waste in the WAMS community garden. Table 9.1 lists common examples of brown and green waste.

Table 9.1

Browns – Carbon heavy (40)	Greens – Nitrogen heavy (60)
Pine bark mulch	Lawn clippings
Eucalyptus mulch	Plant cuttings
Coffee chaff	Coffee grinds
Cardboard	Kitchen waste
Wood chips	Manure
Saw dust	
Shredded paper	
Old leaves and twigs	

Smell and wetness

	A1-A4	A5-A8	A9-A12	A13-A16
Year 1	Brassicas	Other	Alliums	Legumes
Year 2	Legumes	Brassicas	Other	Alliums
Year 3	Alliums	Legumes	Brassicas	Other
Year 4	Other	Alliums	Legumes	Brassicas

	B1-B4	B5-B8	B9-B12	B13-B16
Year 1	Brassicas	Other	Alliums	Legumes
Year 2	Legumes	Brassicas	Other	Alliums
Year 3	Alliums	Legumes	Brassicas	Other
Year 4	Other	Alliums	Legumes	Brassicas

	C1-C4	C5-C8	D1-D5	D6-D10

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Reflections on lessons learned

Learnings

Design choices

Making sensible design choices was an important part of the work done in the WAMS community garden. To do this, the boundaries and desired outcomes were important factors. The main physical boundary from the outset was the immediate climate – and that impacted the type of irrigation system required.

The desire for a large-scale garden that could provide multiple fruit and veg boxes to the community also impacted the type of irrigation system. The failure of self-constructed wicking beds quickly moved things towards what was commercially available. Biofilta FoodCubes, although a larger upfront investment, were easier to set-up, and more-widely tested. They also allowed easy scaling up the garden.

Data collection

Data collection has proven one of the hardest challenges in the recent history of the WAMS community garden. Data collection in the garden depends upon building up a routine of recording and storing. Previous attempts at data recording have fallen short of storing any logged data, and so renewed attempts are necessary. This means building an understanding of what each data metric relates to, how often it should be monitored, with what equipment it should be monitored, and in what easy-to-use format it should be logged. The data sheets constructed in this report seek to address this and should ultimately be changed in ways deemed useful / easy-to-use by the everyday WAMS community gardeners.

Collaborating teams

Since the WAMS community garden collaborates with UNSW, it is important all collaborating teams invited to work in the space follow the community-led approach. This means listening and follo ( )-11.8 (d.2 (el)3.b(pac)-

Garden user reflections

The most intimate knowledge of the garden is held by those who physically look after it. Planting, watering, harvesting, and testing, are all things that over time attune the garden users to the health of the garden and what seems to be working and what is not. Therefore, it is useful at the end of a harvesting season for the garden users to reflect on their observations. These might help with the way things operate in the future. Appendix B.1 can be printed off and used as a logbook for these reflections.

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