

# Webinar: Discover the future of organic waste innovation



A collaboration with:



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# Acknowledgement of Country



We acknowledge and pay respect to the Traditional Owners of the Murray–Darling Basin and their Nations.



We invite you to write in the **chat** now and acknowledge the Traditional Owners of the location you're joining from today.



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# Our research programs



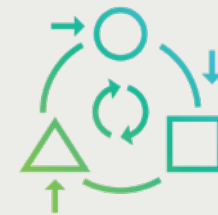
Foresight and decisions



Technology and opportunity



Adaptation and innovation



# Our challenges



**Building Capacity to Confront Climate Change Together**



**Creating Value from Digital Technologies to Support the Irrigated Agriculture Sector**

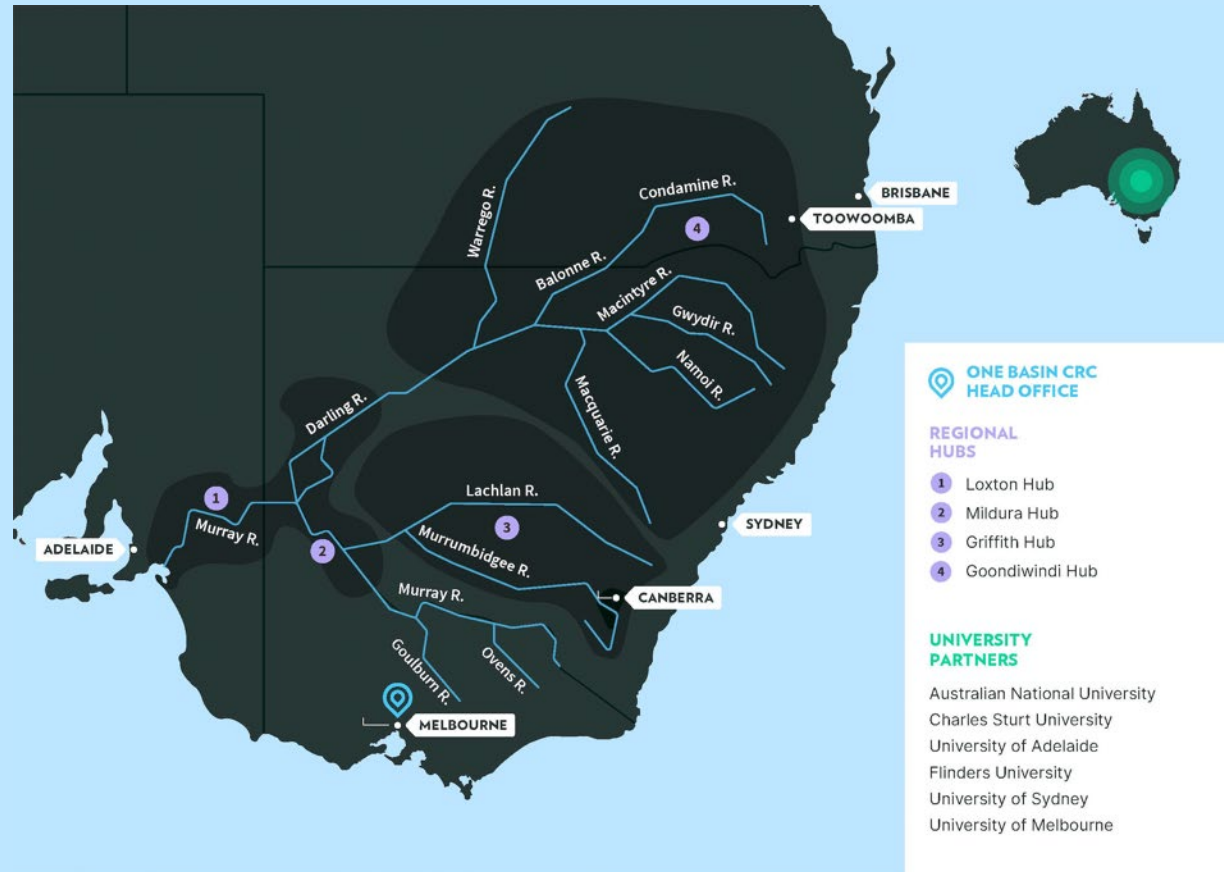


**Enhancing the Water Supply System to Deliver for Multiple Uses**



**Realising Value From and Within Rural Industries and Communities**

# Regional hubs



# Housekeeping



Webinar will run for approximately **60 minutes**



**Recording** link will be emailed to you, uploaded to our website and YouTube channel



**Short 1 minute survey** will pop-up at the conclusion— help shape our future training



Click **Q&A** to:

- Ask questions and make comments
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# Today's panellists



Roger Knight,  
*Western Murray  
Land Development  
Group*



Marti Beeston,  
*One Basin CRC*



Karen Lyons,  
*Western Murray  
Land Development  
Group*



Dan Hutton,  
*DOD Hutton*







# Biochar Working Group – Agenda



## **1BCRC Quickstart Project: Novel biological products to increase agricultural production and reduce environmental impacts**

### Agenda:

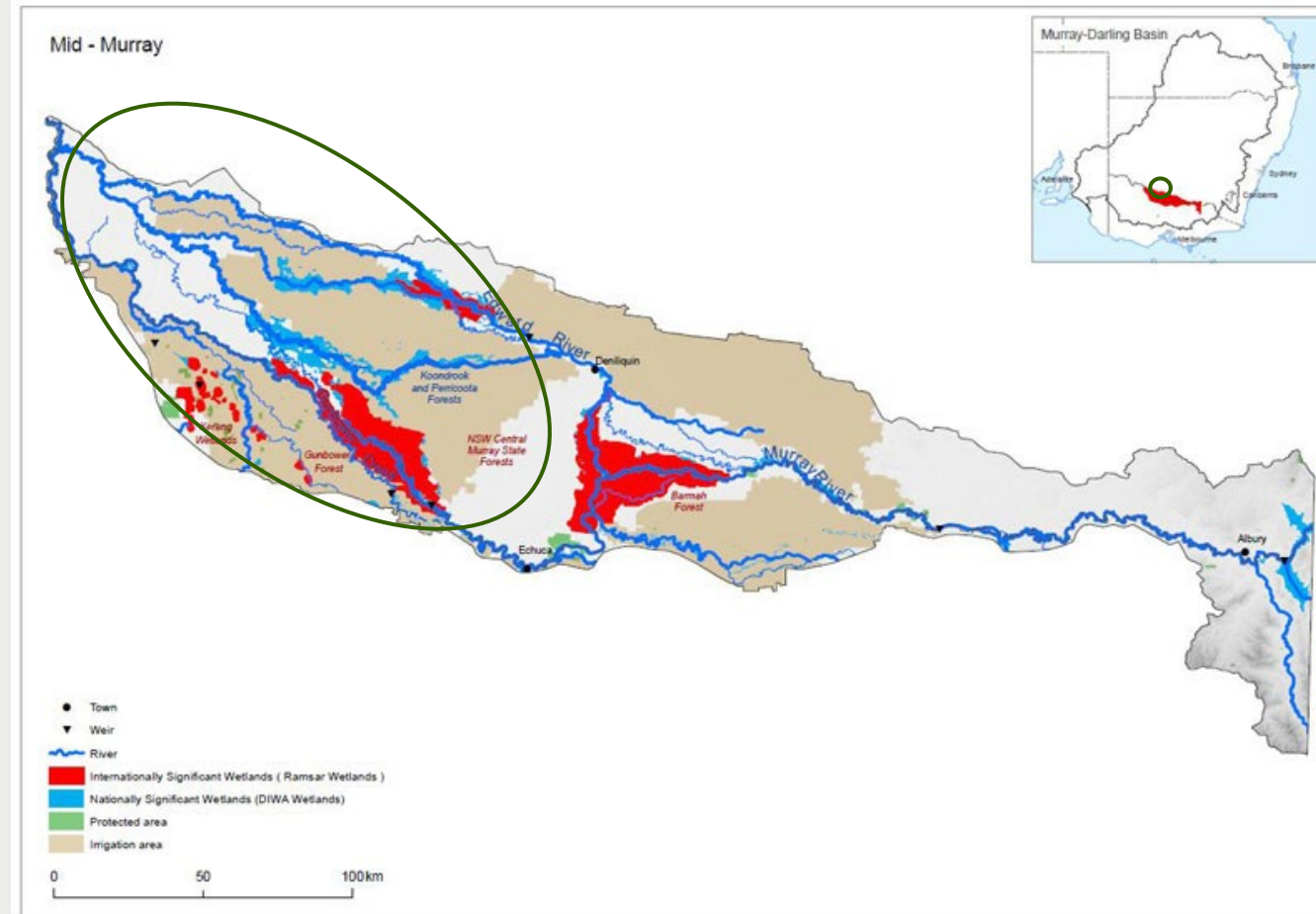
- Biochar group history & stakeholder engagement
- Benefits of biochar & Working Group
- Local feedstock & current uses
- Koondrook Perricoota Forest flow obstruction residue
- Potential benefits of biochar
- Visioning process & core values
- Next steps: funding for production & agronomic trials
- Potential local business uses
- Acknowledgement



# About Western Murray Land Improvement Group & Our Region



- **About Western Murray Land Improvement Group (WMLIG)**
- **Pillars:**
  - Ag Research, Development and Extension
  - Industry Diversification
  - Landcare
  - Environmental Services
  - Environmental Markets
- **Our Region**



# Biochar Working Group – Stakeholder Engagement



- History of the working group
- Collaboration
- Stakeholder engagement activities
- Capacity building for biochar working group Members
- Collaboration Success: Diverse stakeholder involvement forged new networks

## MURRAY CONNECT

A Central hub for connecting people, industry and research for the purpose of facilitating adaptation withing the community to grow economic sustainability within the region.



# Biochar Working Group – Purpose and target outcomes



- **Purpose & focus area:** Utilising local organic waste streams and converting into useful agricultural products via pyrolysis as a circular economy initiative
- **Target outcomes:**
  - Utilise agricultural waste and forest residue.
  - Improve air quality, health outcomes, and regional amenity.
  - Enhance carbon sequestration, livestock methane mitigation
  - Improve agricultural production, improve soils and resource use efficiency (water, fertiliser)
  - Improve Environmental water delivery efficiencies
  - Create jobs and community wealth (especially for First Nations people).



# Local Organic Waste Streams - Rice Feedstock Data



## Rice Straw

- Production: Up to 15 tons/ha stubble for a 12-ton/ha harvested crop
- Cost: Baled and delivered to Barham region at \$140/ton (2023).

## Rice Hulls

- Production: Local Deniliquin Mill processes ~200,000 tons of rice annually, generating ~40,000 tons of hulls (20% of rice).
- Rice Hull Composition
- Cost: Bulk price: \$8.70/m<sup>3</sup> (+GST); delivered to Barham area ~\$89/ton.
  - Wool bale (compressed, 130kg): \$50 each.

**Other feedstock:** Almond Hulls, municipal green waste, Livestock bedding material etc.



# Feedstock Overview: Red Gum Timber Industry



## Flood Runner Coarse Woody Debris

- Volume: Up to 1 million m<sup>3</sup> available in the Koondrook-Pericoota Forest.
- Potential water saving during managed delivery, improved delivery to targeted locations, improved fish passage etc.

## Timber Industry Red Gum Wood Waste Residue

- Annual Generation: Over 20,000 tonnes
- Current Uses:
  - Some compost production
  - Dairy farm laneways and an avocado farm uses feed pad waste / compost



# Timber Industry Residue Composting Process



## Opportunity:

Timber residue can be screened and separated into specific product categories (examples shown in Photos 1–4). Biochar enhancement / activation would improve product for end users.





# Log Jam Flood- runner Obstruction



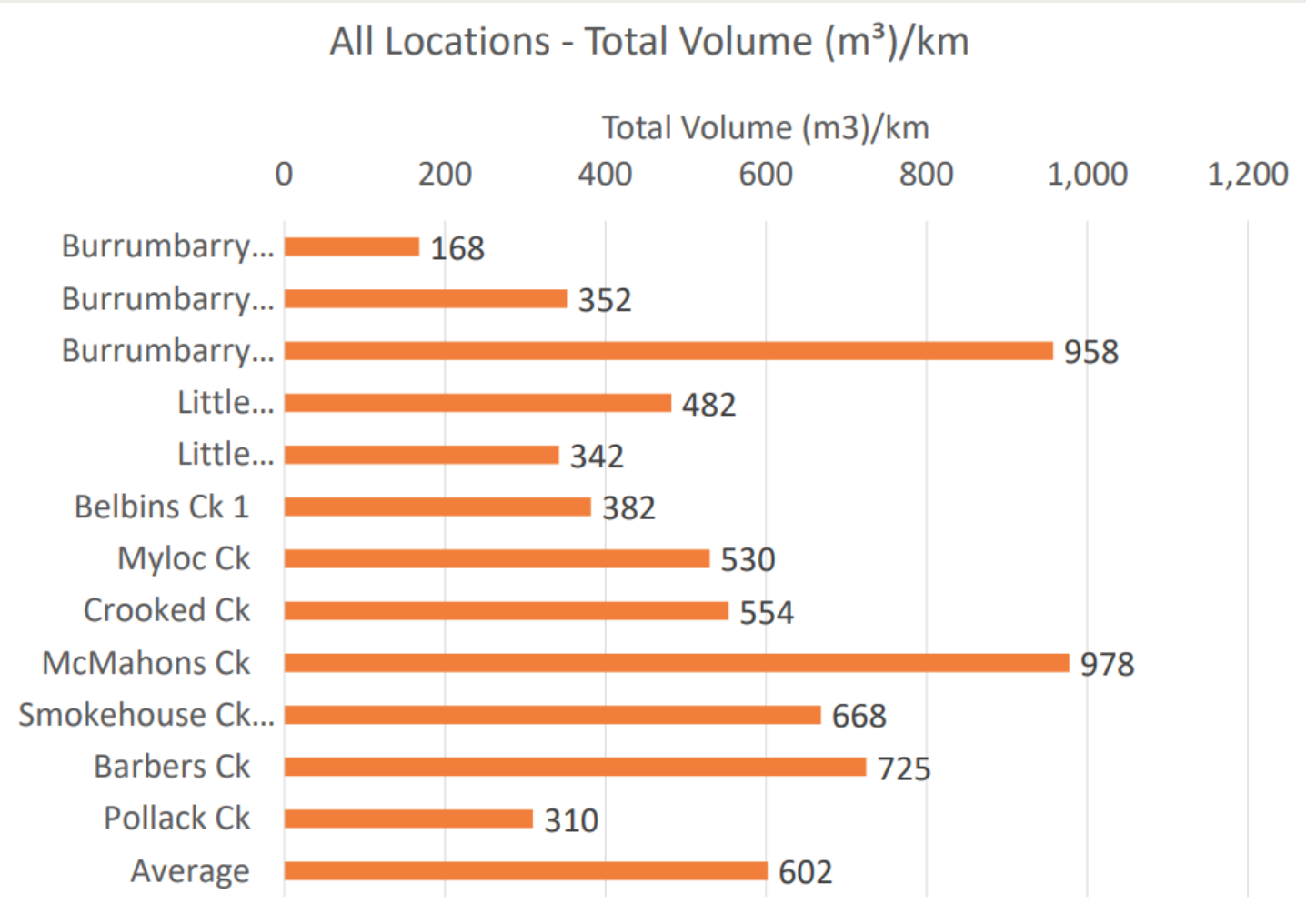
# KP Forest Flow Obstruction Audit Example



# KP Forest Flow Obstruction Material audit (Cont.)



Volume (m<sup>3</sup>)  
& material



Dan Hutton 2024

# Biochar Opportunity



“Recent estimates indicate that biochar could mitigate up to 6.6 Billion tonnes of CO<sub>2</sub> globally by 2050” (IPCC 6th Assessment Report, March 2022)

“Australian biochar can contribute to many of the world’s climate and sustainability objectives, including many of the UN Sustainable Development Goals” (UNSDG, 2015)

“For every 1 per cent you increase the soil carbon, you increase the water holding capacity by 10 to 30 tonnes per hectare”

(Melissa Rebbeck, Environmental Scientist, 2022)

## Carbon cycle vs Biochar cycle



Over 99% of CO<sub>2</sub> captured by biomass re-enters our atmosphere as part of the natural carbon cycle.



Pyrolysing wasted plant biomass into biochar **intercepts the cycle** and converts carbon into a form that is typically stable for **centuries to millennia**.

# Potential Benefits of Biochar



## Environmental Benefits

- Enhanced environmental health through reduced chemical leaching and contamination.
- Carbon sequestration: captures carbon for long-term environmental sustainability.
- Air quality improvement: reduced PM2.5 and PM10 particulates from crop residue burning (e.g., rice straw).



## Agricultural Benefits

### •Livestock Health & Productivity:

- Livestock methane reduction which:
  - improves feed conversion and improves animal health.
- Inclusion of bio-oil and tannins from pyrolysis process further boosts health outcomes.



# Potential Benefits of Biochar (Cont.)



## Soil Health Improvements:

- Enhances organic matter, cation exchange, soil water-holding capacity / moisture retention.
- Increased nutrient availability & long-term nutrient retention capacity.
- Improved fertiliser use efficiency
- Storing beneficial microbes and feeding plant
- Suppresses plant diseases and promotes microbial symbiosis, increasing nutrient bioavailability and plant growth.
- Bioremediates contaminated soils, improving food safety
- Ameliorates soil pH
- Aerates soil and enhances root growth



# Potential Benefits of Biochar (Cont.)



## Biochar Yield Effects (Meta-Analysis)

- Biochar coated fertilisers and plant seeds bioaccumulate biochar
- Unfertilised soils: Biochar alone → 16% yield increase.
- With fertiliser: Fertiliser alone → 24% yield increase; Biochar + Fertiliser → 43% yield increase.

## Biochar Boosts Photosynthesis and Biomass

### •Key Data (Global Meta-Analysis, 2020):

- Photosynthesis improvements: +27% (rate, transpiration, water use efficiency).
- Biomass gains: Total biomass +25%, Root biomass +34%, Shoot biomass +22%.



# Biochar Working Group Co-design - Questions and Feedback



## Key Questions Raised

What is our value?

How does biochar assist our farmers and create opportunities?

How can we grow carbon and realise co-benefits across the region?

Can we design modular systems for better integration?



# Biochar Working Group - Core Values



## Core Values:

### Environmental Commitment:

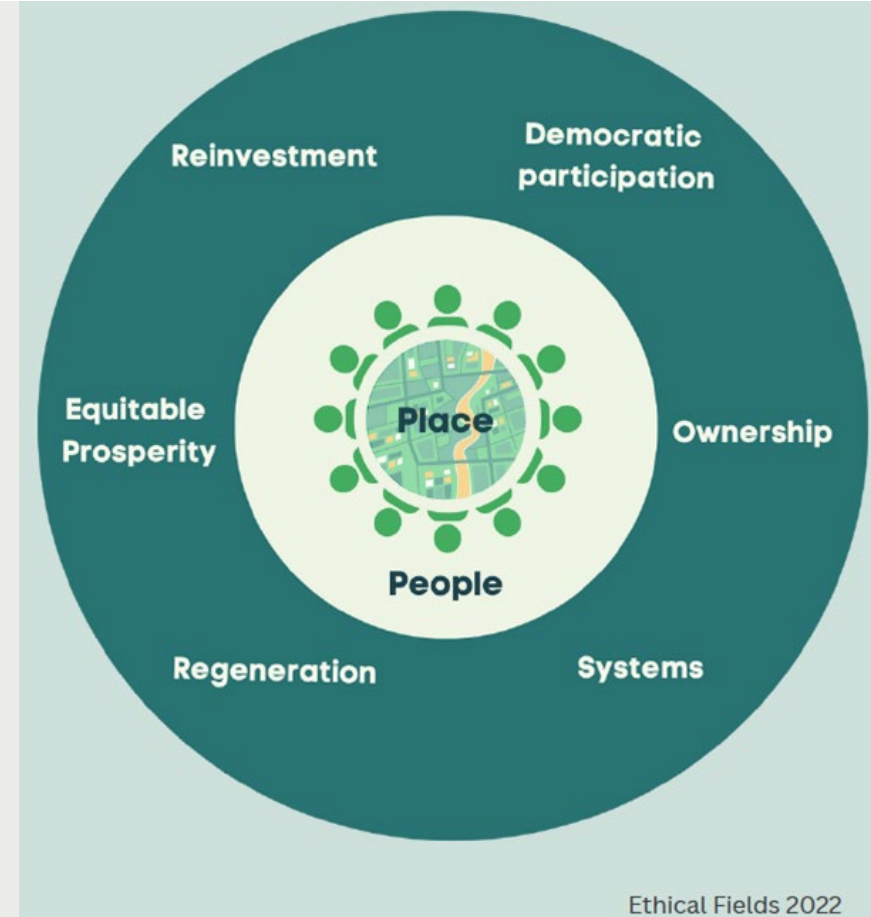
- Circular Economy
- Net Zero Emissions, sustainability

### Economic Priorities:

- Local Suppliers and Benefits
- Opportunity and Wealth Building
- Improve competitiveness
- Reinvestment

### Community and Partnerships:

- Partnerships / Community Collaboration
- Building Community Connections
- Long-term Employment



# Biochar Working Group Co-design - Feedback (Cont.)



## Group Feedback – Triple bottom line objectives

### Economic Strategies:

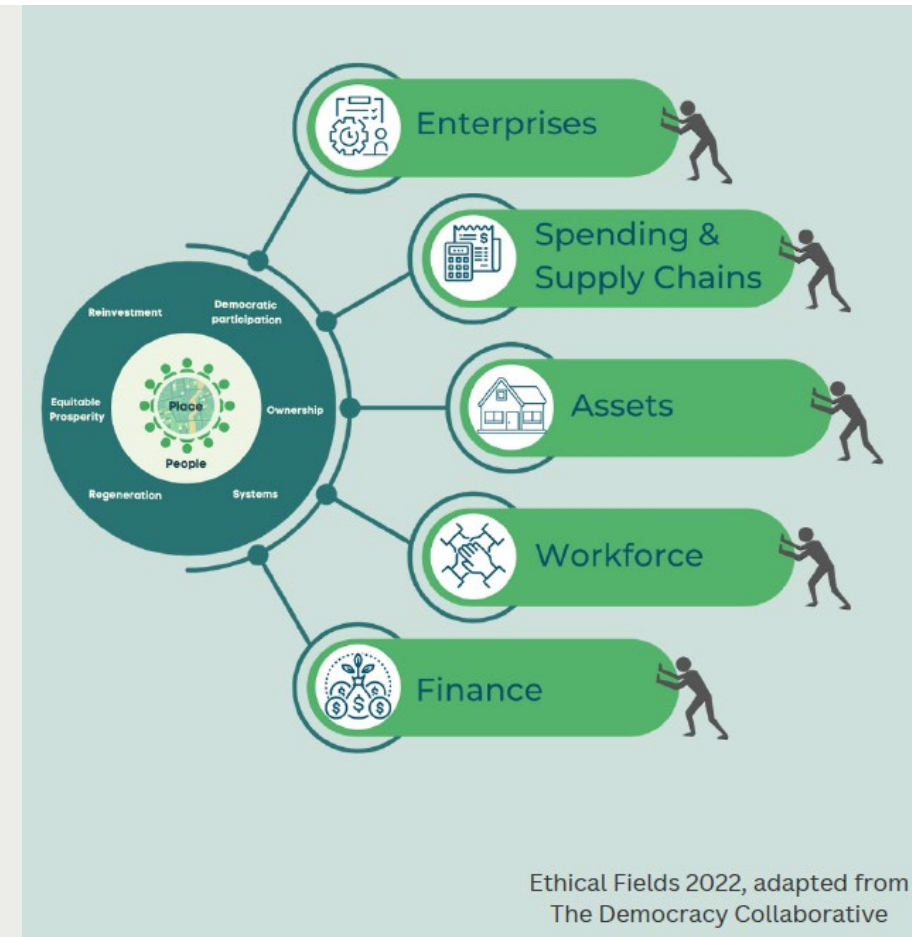
- Explore community wealth building framework to minimise economic leakage and boost local investments.
- Develop sustainable business models that support farmers and buffer against climate change.

### Community and Partnerships (Cont.):

- Build a holistic business model that fosters partnerships, builds community wealth and self-reliance for Traditional Owners.
- Establish a circular economy to stimulate local businesses, provide economic self-sustenance for reinvestment in community outcomes

### Sustainability and Innovation:

- Adopt a place-based innovation approach to align with net-zero emissions goals.
- Create modular designs to integrate systems and enhance efficiency.



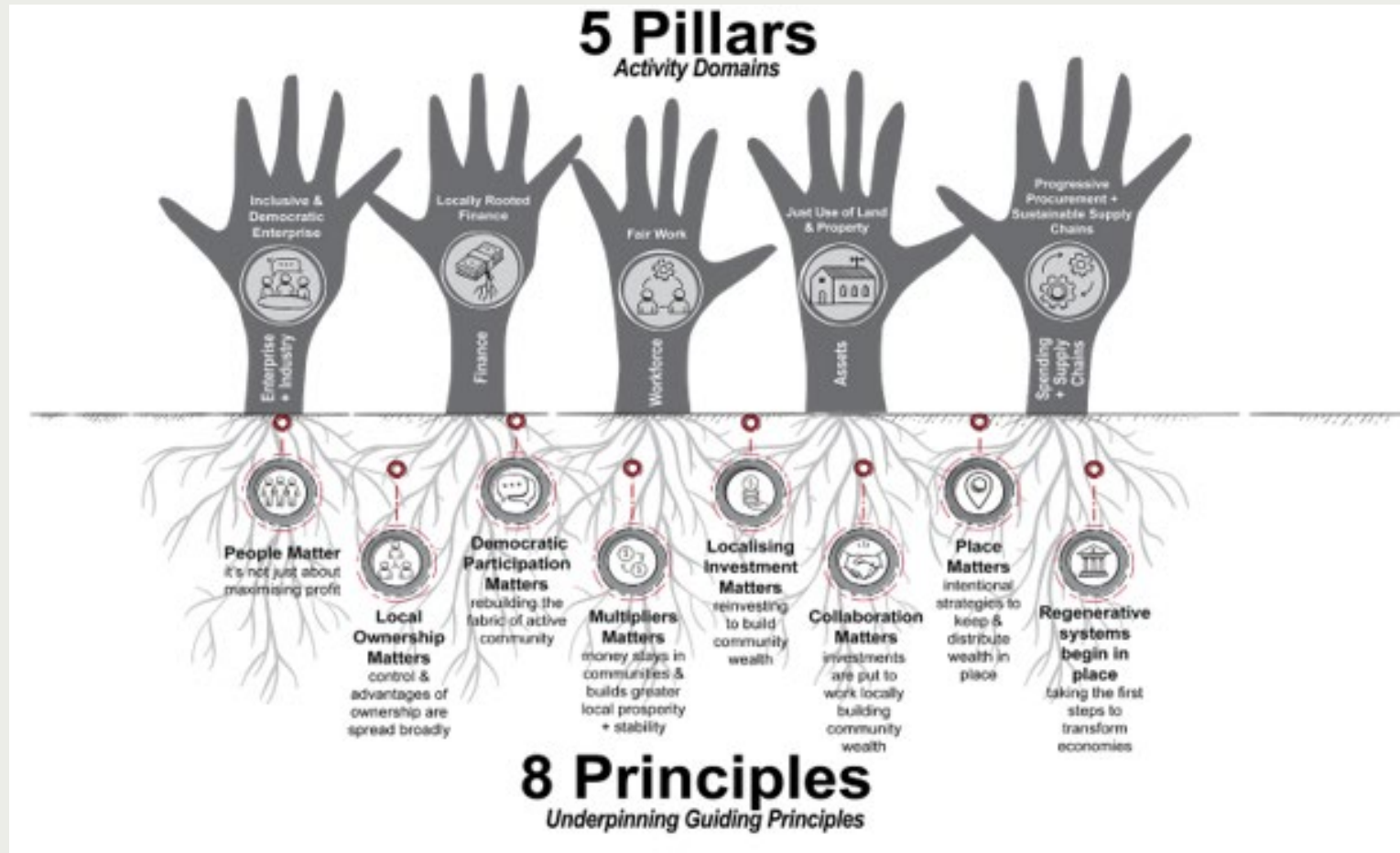
Ethical Fields 2022, adapted from  
The Democracy Collaborative

# Vision and Core Values



**Key Focus:** Aligning with community values to deliver meaningful, sustainable, and impactful outcomes.

**Vision statement:**  
*"We envision a future where biochar innovation solves environmental problems, creates value for primary industries, and strengthens our community through partnerships, jobs, and wealth building."*



# Next Steps: Funding & Trials



**Biochar Working Group (Phase 2):** Establish a biochar trial project team to co-design a shovel ready funding application to produce biochar and conduct trials.

**Potential Trial Partners:** Southern NSW Innovation Hub and affiliates, government agencies, Landcare and producer groups, Industry

**Regional agricultural issues that need addressing:**

- Soil compaction (west)
- Acid soils / aluminum toxicity (east)
- Stock feed addition trials (e.g. dairies, feedlots / piggery)
- Soil carbon
- Scope 3 emissions in 2026 - C insetting & offsetting



# Trial planning



## Identified trial needs:

- Biochar production: Purchase / lease pyrolysis equipment for pilot trials for different feedstock testing and processing optimisation, including pre & post feedstock and biochar activation.
- Flood runner residue removal trial
- Plan with trial proponents in different geographic areas / farm systems.
- Trial 'enhanced' biochar and composts using specific feedstocks, mixes of feedstocks, compost, microbials, activated / aged / fermented material
- Identify and engage researchers / specialist advice re tailoring 'designer' biochars for specific applications



# Tailored Biochars



## Designer Biochars: Unlocking Potential

Provide tailored biochar applications for specific soil / agronomic needs. Trial examples include:

- Optimised biochars for different soil, plants and environment.
- Stock feed additives and trials
- Soil and dung beetles: Illustrate benefits of biochar-fed livestock and dung beetle systems
- Long term trial considerations

**Next steps / call to action:** Invest in long-term trials across different soil types / production systems and regions with interested groups, industry, agencies, institutes



# Potential local business partners



## Potential local research & investment partners:

- Moama Local Aboriginal Land Council
- Local community members
- JBS (Yambinya Feedlot & Balpool Piggery)
- Bunnaloo feedlot
- Ridleys stockfeed (Cohuna)
- Irrigated Farmers Network
- Horticulture Australia
- Peninsula Organics
- Murray Landcare Collective
- Murray Dairy
- Almond Industry
- Counterpoint stockfeed (Barham)
- NSW Department Primary Industries
- Murray Local Land Services
- SNSW Drought & Innovation Hub
- One Basin CRC
- Red Gum Timber Industry
- Sunrice / Rice Growers Association
- Other? Needs scoping

# Thankyou – Working Group Acknowledgement



- Emma Searle (Initial Facilitator)
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- John Kerr (Moama LALC)
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- Faye Ashwin (Red Gum Timber Industry Rep)
- Karen Lyons (Facilitator - WMLIG)
- Leigh Fletcher (WMLIG)
- Lambert Brau (Deakin University)
- Kylie Doyle (Dairy Farmer)
- Rebecca Lester (Deakin University)
- Beck Hayward (Murray River Council)
- Simon Wright (CSU)
- Graham Naldar (Organic farmer rep)
- Josie Grenfell (Food 2 Soil)
- Annabel Schweiger (Food 2 Soil)
- Alex Sas (Wine Australia / 1BCRC Incentives and Investments challenge focus area)
- Dan Hutton NRM / cultural heritage consultant
- Jody Hay (Dairy Farmer)
- Barrie Williams (Landscapes SA)
- Samatha Doove (Ethical Fields)
- David Washbrook (Farmed Carbon)
- Wayne Shields (Peninsula Organics)



# Questions?



# Thanks for attending



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