What does a circular economy mean for cotton?

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The present reality...
95.1 million tonnes fibre production (2016, Statista)

92 million tonnes waste annually (2017, Pulse of Fashion estimate)
Towards a new economy

Production, consumption and circulation

**Decouple** economic growth from resource depletion and environmental impact

Aim to accomplish **sustainable development**

Industrial ecology – cradle-to-cradle

Waste = food

Biological and technical resource streams

No ‘monstrous hybrids’

(Cradle to Cradle, McDonough and Braungart 2002)
Circular economy principles

1. Design out waste and pollution
2. Keep products and materials in use
3. Regenerate natural systems

Criticism 1
The circular economy ‘rebound effect’

Criticism 2
Less focus on the social dimension of sustainability

Three principles: Ellen Macarthur Foundation - https://tinyurl.com/yx9ombpu
Cotton and a circular economy

1. Design out waste and pollution
   Adding value to cotton’s byproducts

2. Keep products and materials in use
   Enhancing inherent fibre qualities

3. Regenerate natural systems
   Tackling environmental impact

And more!
Interventions across the value chain

fibre  yarn  fabric  cut  sew  garment

All diagrams – Alice Payne, some icons adapted from the Noun Project, used under license
Keep materials in use - downcycling

As more brands implement take-back schemes – more pathways needed

Rags (needs to be cellulosic)
Shoddy to insulation, non-wovens, carpet underlay

Products in other industries
Waste to energy
Upcycling and remanufacturing

Opportunity for new value-added products

Improve supply chain efficiencies
Utilising in-system waste – recycled fibres

Needs virgin fibre for strength
Closed loop recycling

Biological closed loop – safely composting garments

Technical closed loop – mechanically or chemically recycling synthetics

Will this lead to lower primary production?

What about the rebound effect?
Open-loop recycling into fibre – technical

PET bottles to polyester
Fishing nets to polyamide
No monstrous hybrids please!

Challenges with microfibre pollution

diagram from Payne 2015
Open loop recycling into fibre - biological

Agricultural waste → [Diagram of processing steps] → [Result of processing]

Cellulosic origin – old process, new feedstocks
Promoting circular consumption

Refuse
Rethink
Reuse
Repair

Promoting emotional attachment to one's garments

Mending existing garments
Promoting material durability and longevity
Garment reuse: resale, rental, sharing

Resale growing faster than fast fashion

In Australia alone, over 30 rental platforms have sprung up

Will this lead to lower primary production?
Consumer trends

- Changing consumption patterns
- Rapid growth in peer-to-peer sharing and resale platforms
- Climate activism

Images from XR Boycott Fashion Instagram
Production, consumption and circulation

Ag waste

Fibre suppliers → Spinners → Fabric Producers → Apparel Producers → Brands and Retailers
Interventions – research @ QUT

Strategies to address labour issues in the cotton value chain*

Fibre separation technologies
Wool/polyester
Cotton/polyester

Sustainable Value Chain Analysis of Australian cotton*

Textile waste as feedstock for next generation batteries

Robotics and AI to sense different fabrics and disassemble used garments

*Funded by Cotton Research and Development Corporation
Cotton’s contribution to a circular economy

Cotton as inherently biologically circular
Virgin cotton as an enabler of textile circularity
A circular economy that considers the social dimension
Thank you!

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