Genetically-modified trees: starting points for dialogue

Peter Kanowski
The Fenner School of Environment & Society

fennerschool.anu.edu.au
peter.kanowski@anu.edu.au
“TFD stimulates … collaborative solutions to difficult issues facing forests & people”

TFD Strategic Plan 2011-2015

www.theforestsdialogue.org
Context 1a: genetically-modified trees

- One biotechnology, amongst others
- "GM trees are those that have been modified using recombinant DNA & asexual gene transfer" Brunner et al 2007
- syn. ‘transgenic’ or ‘GE’ – see IUFRO/FAO 2010
Context 2: a(nother) wicked problem

"... All of a sudden, the wedge popped out and Logger Latham knew he was in diabolical trouble... What was he to do..."

"Then he remembered his trusty bush knife..."

Geoff Pryor, Canberra Times, 6.10.04
Context 3: the changing world (... of forests)

Changing climate & changing ecosystems ...

Changing production systems & changing products ...

Map: Dunlop et al 2011. CSIRO
Photo: Stora Enso/Veracel
Context 4: a window of opportunity

- Rapid scientific advances
  “what is appropriate?”
  cf “what is possible?”

- Little GMt deployment
  - 450 ha poplar in China
  - 700 field trials globally

- Strong debate;
  but also reflection & learning?
GM trees: framing the issues

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www.globaljusticeecology.org; www.greenpeace.org/international
GM trees – the agbiotech legacy

“Crudely put, the agricultural GM experience represents a warning, a cautionary tale of how not to assess an emerging technology and allay public concern.” Kearnes et al 2006: 291
Not the agbiotech legacy? – trees are different …

Compared to agricultural crops, forest trees are:
- part of diverse & extensive ecosystems
- long-lived & ‘natural’
- of strong cultural significance
- little domesticated
- not a food source
- more strongly regulated
# GM trees narratives

<table>
<thead>
<tr>
<th>Category</th>
<th>Core position</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Strong’ proponents</td>
<td>- GM technologies offer important benefits (eg productivity, adaptation, lesser impacts) that are impossible, or harder, to realise conventionally.</td>
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<tr>
<td></td>
<td>- Risks vary, &amp; can be assessed &amp; managed.</td>
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<tr>
<td></td>
<td>- Risk assessment should focus on product not process.</td>
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<tr>
<td>‘Conditional’ proponents</td>
<td>- GM technologies may offer benefits, but principally in ‘public-good’ applications.</td>
</tr>
<tr>
<td>or opponents</td>
<td>- Levels of precaution &amp; complementary action should be higher than for crops.</td>
</tr>
<tr>
<td>‘Strong’ opponents</td>
<td>- Industrial IMPF is (generally) unacceptable.</td>
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<td></td>
<td>- Use of GM technologies will further disadvantage those already disadvantaged.</td>
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<tr>
<td></td>
<td>- The risks and costs of GM trees are unacceptable, &amp; demand a very strong precautionary approach.</td>
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Key elements of GMt discourses  #1

Ethical considerations & moral imperatives

- How can ethics help us resolve these dilemmas?
Key elements of GMt discourses  #2

Land & resource ownership & use

- How to achieve more equitable benefit-sharing?
Key elements of GMt discourses  #3a

Environmental benefits & risks

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
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<tbody>
<tr>
<td>Adaptation:</td>
<td>Spread of transgenes:</td>
</tr>
<tr>
<td>to new or altered environments</td>
<td>vertically, horizontally</td>
</tr>
<tr>
<td>Intensification of production:</td>
<td>Potential ecosystem disruption:</td>
</tr>
<tr>
<td>necessary to meet demands</td>
<td>impacts on species &amp; processes</td>
</tr>
<tr>
<td>Increased returns along value chain</td>
<td>Unstable gene expression</td>
</tr>
<tr>
<td>Reduced environmental impacts</td>
<td>Other unexpected effects</td>
</tr>
<tr>
<td>associated with reduced inputs</td>
<td></td>
</tr>
<tr>
<td>Recovery of doomed species</td>
<td></td>
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</tbody>
</table>

- General agreement that genetic confinement a prerequisite?
Key elements of GMt discourses  #3b

Strategic benefits & risks

- Hard decisions, at many levels – ‘no regrets’?
In the larger context …
Governance & regulation: where world views collide …

Internationally

Nationally

- Significant variation (approach, process, capacity)

Non-state

- Significant consequence – eg FSC ban on GMt
Dialogue about GM trees …

Opportunities & challenges

- learning from the genetic technologies/ GM crop/ plant breeding debates
- learning from other forest(ry) experiences, including IMPF, LCF, 4Fs …
- finding ways for the sciences (social & life) to inform, but not overwhelm
  “in the absence of knowledge, precautionary approaches … prevail”  
  Boyd 2010
- generating knowledge at low risk
In summary …

- A ‘super-wicked’ (‘diabolical’) problem, but a window of opportunity

- Some instructive key learnings
  “if modern biotechnology is to stand a chance, three main conditions … utility, low risk, and an assurance that the biotechnology is used in a decent way” Gamborg & Sandoe 2010: 168-9

- Society needs scientific advance, but science needs legitimacy
Dialogue about GM trees …

3 interdependent but separable levels …

- Informing (real) dialogue
  - building shared understanding & trust

- Should we use GM technologies in trees? eg what goals, which technologies?
  - what levels of public good/ public funding?

- For any GM technologies & products we may use, what are appropriate standards & governance?
Key sources/ more information


Institute of Forest Biotechnology. 2010. *Forest biotechnology* ... [www.forestbiotech.org](http://www.forestbiotech.org)

Murphy. 2007. *Plant breeding & biotechnology*. CUP.
