Growing Strong Industries ~ Developing New Ideas ~ Nurturing Natural Resources

Annual Research Ethics Conference: Research Integrity and Trustworthy Science – Challenges & Solutions

Economic Development and Natural Resources Research

Perspectives on Integrity and Trust in Private-Public Partnerships

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Natural Resources Research Institute
University of Minnesota Duluth
Driven to Discover
The Natural Resources Research Institute

Duluth Labs
- 4-story research building; semiworks capability
- 75-100 personnel
- Administration, initiative leadership

Coleraine Labs
- 27 acre, former USS research site
- 30-40 personnel
- Mineral processing, metallurgy, renewable energy
Innovation Principles

Reduce Waste – higher yield, *reduced cost*, cost avoidance & repurpose

Broaden Portfolio & Create Higher Value – move up value chain; drive economic resilience; *retain value*

Resource Stewardship – embrace as *differentiator for competitive advantage*

*System-Based Solutions*
The ECONOMIC NEXUS

**ENERGY**
- Geology/Hydrology/Hydrogeology
- Water treatment technologies
- MN water remediation
- Ecosystem characterization
  - forests/wildlife
  - lakes, rivers, streams

**WATER**
- Conservation

**MATERIALS**
- Compressed air energy storage
- Liquid fuels
- Solid fuels
- Bioeconomy technologies
  - Chemicals, extractives
  - Lumber Paper Housing
  - Economic Geology
- Mineral Processing
  - New products from existing resources
  - New processes to tap new resources
- High-value Iron
- Secondary products

**MORE**
- Thermally-Modified Timber
Impact Management

- Characterize systems, core values and relationships
  - Understand life cycles, true costs and impacts
  - Provide information for long-term decision-making

IDENTIFY OPPORTUNITIES & FRAME RESEARCH
Aspects of Ethics and Research Integrity

Broad, Unbiased Engagement

Transparency with Context

Innovation and Trust

Science Evidence & Scale

Methods & Control = Quality & Reproducibility

Safety

Intellectual Property & Conflict of Interest Discipline

Implications

The Enemy is Uncertainty
A Sustaining Cycle

Cost -> Risk -> Benefit

1. Framing
2. Research & Development
3. Peer Review
4. Co-Education
5. Shared Goals
6. Trust
7. Impact Management Planning
8. Transparency with Context
9. Best In-Class Performance

The Social License
Looking forward -
It’s About Management of the Maps…

Opportunity & Sound, Long-Term Decisions

✓ Sustainable Industries – Protected Environment – Resilient Communities
✓ Flexible responses to global changes
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“Our Research Goes to Work for You”