Interdisciplinary Research

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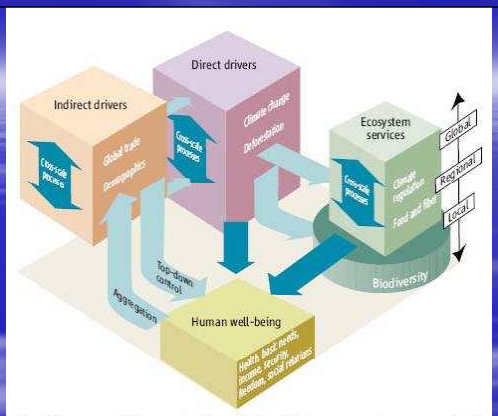
Rural Economy

What is Interdisciplinary Research?

- Interdisciplinary: "Of, relating to, or involving two or more academic disciplines that are usually considered distinct."
  - *The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.*
- Combination of disciplines to solve a problem or address a research question.
- Now moving to "intersectoral" research
  - Partnership between researchers and "managers"
- Requires a "higher order" research question
- Common in any applied resource management discipline
- My focus today: natural – social science linkage in resource management

Why the interest in ID Research?

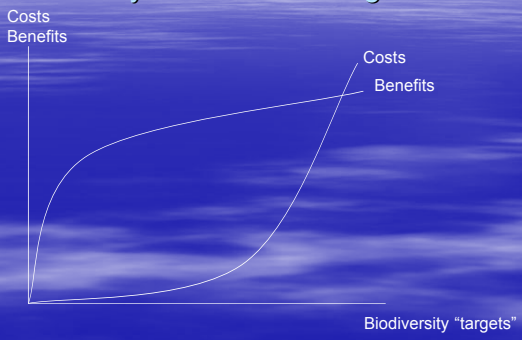
- ID research is the only way to solve many of the fundamental problems facing resource managers
  - Developing environmental quality standards
    - Requires understanding of the linkage between human systems and natural systems
    - How will a change in a policy affect changes in human activity?
    - How will these changes in human activity affect the environment?
    - How will changes in environmental quality affect humans?
  - Feedback loops



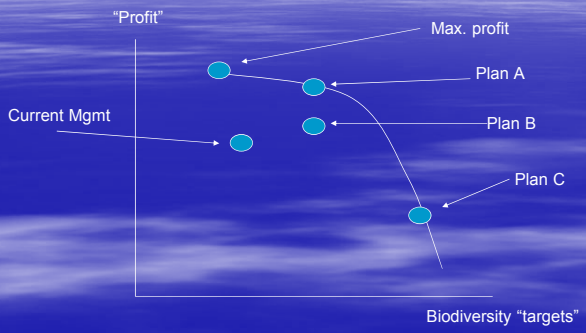
The MA conceptual framework (2), modified to illustrate connections among local, regional, and global scales for a few processes. Light blue arrows indicate actions that are amenable to policy interventions.

Source: Carpenter et al, 2006. Millennium Ecosystem Assessment: Research Needs. *Science 314: 257-8.*

Example: Cost benefit analysis of biodiversity conservation targets



A graphical approach to cost benefit analysis: Costs turned upside down: Production Possibility Frontiers



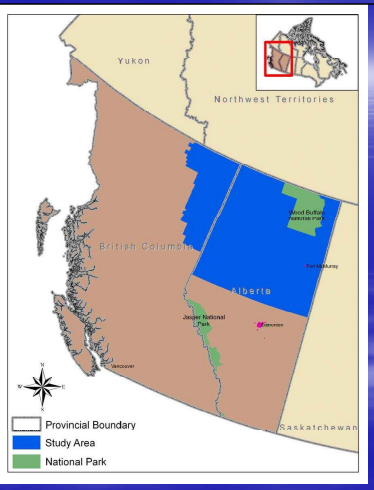
SFMN Bioregional Assessment Project Boreal Ecology and Economics Synthesis Team (BEEST)

Investigators:
- Vic Adamowicz
- Fiona Schmiegelow
- Steve Cumming
- Marian Weber
- Grant Hauer

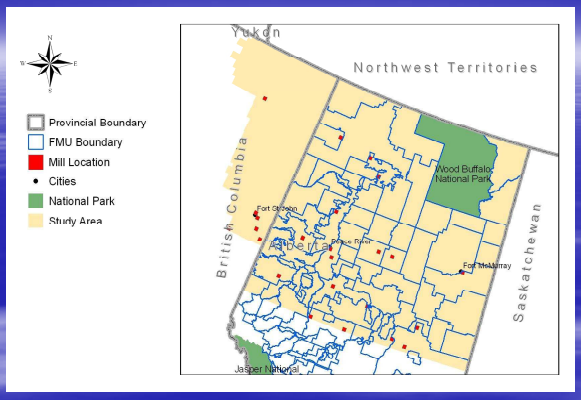
Students and Support:
- Michael Habteyonas
- Robert Jagodzinski

Partners
- Alberta Sustainable Resource Development
- Alberta Energy
- Alberta Environment
- B.C. Ministry of Forests
- Ducks Unlimited
- Alberta-Pacific Forest Industries
- Canadian Forest Products (BC)
- Weyerhaeuser Company
- Millar Western

Funded by the Sustainable Forest Management Network

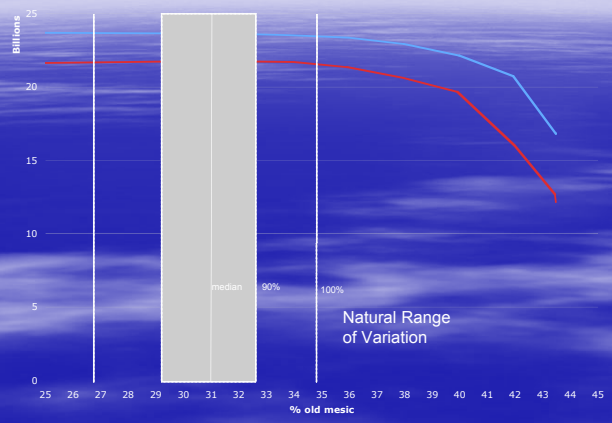


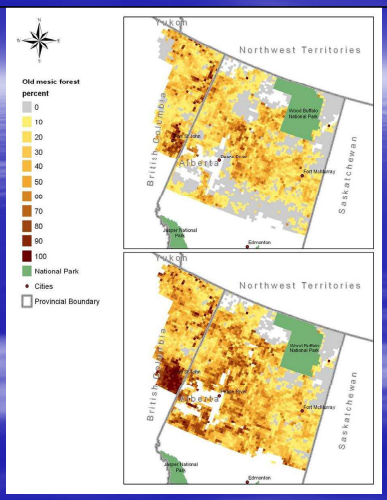
Study Area:
Boreal Forest in Alberta
And Northeastern B.C.



Locations of Forest Products Mills

PPF for Alberta/BC: Forest sector & old mesic forest

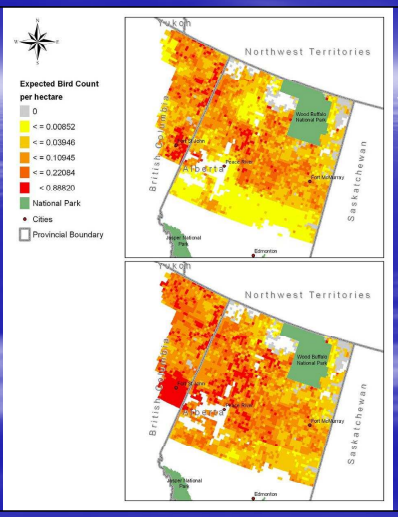




Percent old forest – with no constraints

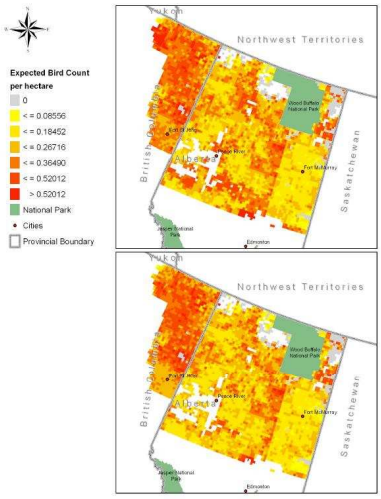
Percent old forest – with 44% constraint

Source: Hauer et al 2007.



Bird count of Canada Warbler with no constraints

Bird count of Canada Warbler with 44% constraint



Bird count of White Throated Sparrow with no constraints

Bird count of White Throated Sparrow with 44% constraint

Ecological and economic tradeoff analysis of conservation strategies for Woodland Caribou

Investigators:
- Vic Adamowicz
- Fiona Schmiegelow
- Steve Cumming
- Marian Weber
- Grant Hauer
- Stan Boutin

Students and Support:
- Michael Habteyonas
- Robert Jagodzinski
- Nancy Holloway
- Pearce Shewchuck
- Thuy Dang Truong
- Kara Barnes

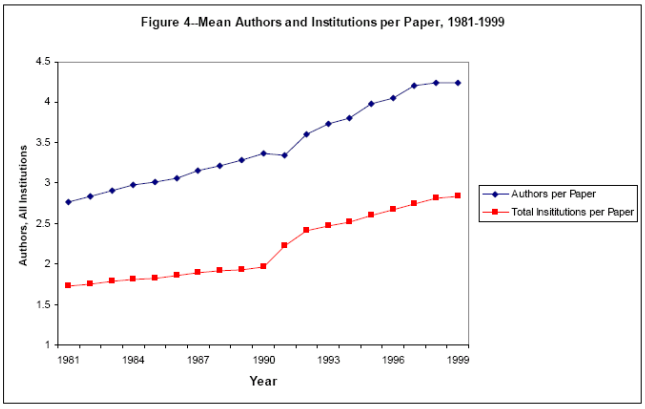
Partners
- Government of Alberta
- Environment Canada
- Government of Yukon
- Treaty Eight First Nations
- Ducks Unlimited
- Alberta-Pacific Forest Industries
- Tembec Inc
- Weyerhaeuser Company
- Tolko Industries
- DMI
- West Fraser Timber Company
- Tolko
- AFPA

Why the interest in ID Research?

- Specialization and division of labour
- Granting agencies are "requiring" it
- Evidence that better "answers" are produced by ID research?
- Evidence that researchers who collaborate generate "better" research?
- Curiosity
- It's fun… to learn how other disciplines approach problems.

Alberta Ingenuity Water Institute Call for Proposals

- "Ideally, the research will involve a multi-disciplinary approach -- including biologists, engineers, economists and other social scientists -- to provide the knowledge water users, managers, industry, policy makers and consumers to help them make informed choices. As such, the research funded by the Water Institute must be translated into stakeholder information."
  - http://www.albertaingenuity.ca/water.aspx



Source: Adams et al, 2004 http://www.nber.org/papers/w10640

Bozeman and Lee (2004): The most commonly cited motives for research collaboration include:

1. Access to expertise
2. To improve likelihood of research funding or to share funds
3. To obtain prestige or visibility
4. To obtain specialized knowledge about a technique
5. To pool knowledge for tackling large and complex problems
6. To enhance productivity
7. For fun and pleasure
8. To educate or mentor students and junior colleagues

Evidence of the benefits of ID research

- Collaborative scientists generate more publications, get cited more often
  - Is this because of collaboration or because of the type of scientist? (Bozeman and Lee, 2004)
- Interdisciplinary research (in forestry) is more widely cited (Steele and Stier, 2000)
- Grants are increasingly requiring interdisciplinary teams

Problems with ID Research

- Time
- Communication barriers
- Disciplinary inflexibilities (arrogance?)
- Reward systems
- Where to publish?
- Sacrificing disciplinary expertise?
- When to jump into ID research?
- Integration by stapler
  - AKA – grab the money and run

Issues for Students

- A different kind of graduate student experience
  - Part of a larger group
  - Working towards the solution of a "real" problem
  - Broader experience
  - Developing a better network
    - Important for future work
- The challenge – learn a discipline and contribute to a team, or become "interdisciplinary" early on.

Issues for Students

- What if your supervisor doesn't want you to work in an interdisciplinary team? [Golde, C.M. and H.A. Gallagher. 1999.]
  - Do PhD programs create "MINI-MEs"
- Career risks?
  - Career path?
  - Time delays?
  - Do you really want to engage in interdisciplinary work in your MSc or PhD? Perhaps you should know your discipline well before moving into ID research?
- ' For example, a graduate student in one center described his position as "non-traditional, highly beneficial, but completely risky," while a postdoctoral fellow in another center confided that "part of me thinks I did a little bit of career suicide by coming here." ' [Rhoten, 2004, pg9]

Rhoten, D. and A. Parker. 2004. Risk and Rewards of an Interdisciplinary Research Path. Science. Vol 306, pg 2046.

VIEWS ON CAREER EFFECTS OF INTERDISCIPLINARY RESEARCH

	Distribution by rank*							
	G	NTT	PD	AsP	AP	P	PIs	Total
Number surveyed	160	245	84	73	82	232	12	888
Total responses	99	155	59	47	53	147	11	571
Positive	67	104	42	34	43	109	11	413
Neutral	16	43	11	12	8	23	0	114
Negative	16	8	6	1	2	15	0	44

*G, graduate student; NTT, nontenure track; PD, postdoctoral fellow; AsP, assistant professor; AP, associate professor; P, professor; PI, principal investigator. [Source (9)]

Graduate students also more likely to be involved in interdisciplinary collaborations.

Towards ID Research

"Finally, for interdisciplinary research centers to achieve their stated aim of addressing new problems in fundamentally new ways, they must be populated with individuals who can serve as "stars" and as well as those who can be "connectors." These are not always one and the same. Universities, therefore, will have to reconsider the priorities and practices of graduate education and training in order to prepare individuals for such centers. We argue that graduate programs must not only educate future scientists to be experts in the methods, techniques, and knowledge of their chosen disciplines but to have the broader problem-solving skills that require learning, unlearning, and relearning across disciplines." [Rhoten, 2004, pg 11]

Disciplinary versus Interdisciplinary?

- Should one try to understand various disciplines, or develop within a discipline to bring that knowledge to team?
  - I lean toward the latter, but individuals who are "connectors" are very valuable.
    - Try to be a "connector"?
  - Find ways to illustrate how your discipline can help solve the higher order question.

Interdisciplinary Research and Your Scientific Career

By Richard M. Reis

http://chronicle.com/jobs/news/2000/09/2000092903c.htm

- "It is important to keep in mind, however, that strong interdisciplinary programs will succeed only if they build on strong disciplinary programs. The two go hand in hand. Today's scientists need to be both disciplinary and multidisciplinary, to have the breadth to see problems, and the depth to solve them."
- "The key is to be problem-focused in your research as opposed to focusing on techniques or specialized tools. The latter come and go, and as a researcher, you want to be able to shift your approaches as needed to solve more fundamental problems."

Social Science in "Big Science"

- Are social sciences / scientists "different"?
  - "SSH researchers tend to be more critical, even of their own disciplines. This is the nature of these disciplines, and it should be acknowledged at the beginning of the selection process (but often is not)."
    - Evaluation of the Networks of Centres of Excellence – Final Report 2002. Pages 38.
  - Less collaboration in research
- But – things are changing.

Collaboration: Multi-Authored Publications

	1980-85	1986-91	1992-97	1998-2002	Total
Social Sciences and Humanities	27.9	36.5	42.7	50.0	39.4
Natural Science	80.0	85.1	89.6	91.6	87.0

- 2002 – 2/3 of social science papers were multi-authored

Source: Vincent Larivière., Yves Gingras, Éric Archambault. Canadian Collaboration Networks: A Comparative Analysis of the Natural Sciences, Social Sciences and the Humanities. http://www.ost.uqam.ca/OST/pdf/articles/2005/Comparative_analysis_networks_collabo_NSE_vs_SSH.pdf

Conclusions

- ID research is important if we are going to address the real problems we face in resource management today.
- Increasingly research proposals are being evaluated by interdisciplinary evaluation committees – thus a need to identify your research within an interdisciplinary framework.
- The main issue is the identification of the right "question" – this will identify the roles to be played by different disciplines
  - Feedback effects are a common reason for the need for ID research
- A useful approach – bring your disciplinary expertise to the team and learn how to work toward solving the common problem.
- However, ID can be costly and training and reward systems are not yet well established
- But it's too much fun to stay away from!

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