UQÀM
Université du Québec à Montréal

TRIADE

Vers des plantations résilientes, et complexes, et productives, et respectueuses, et multifonctionnelles, et pas trop moches, et … et quoi encore ?!

Alain Paquette, Ph.D.

Centre d'étude de la forêt, UQAM, Projet TRIADE

Groupe de réflexion - plantations AIPL

Chaire de recherche CRSNG - Hydro-Québec sur le contrôle de la croissance des arbres

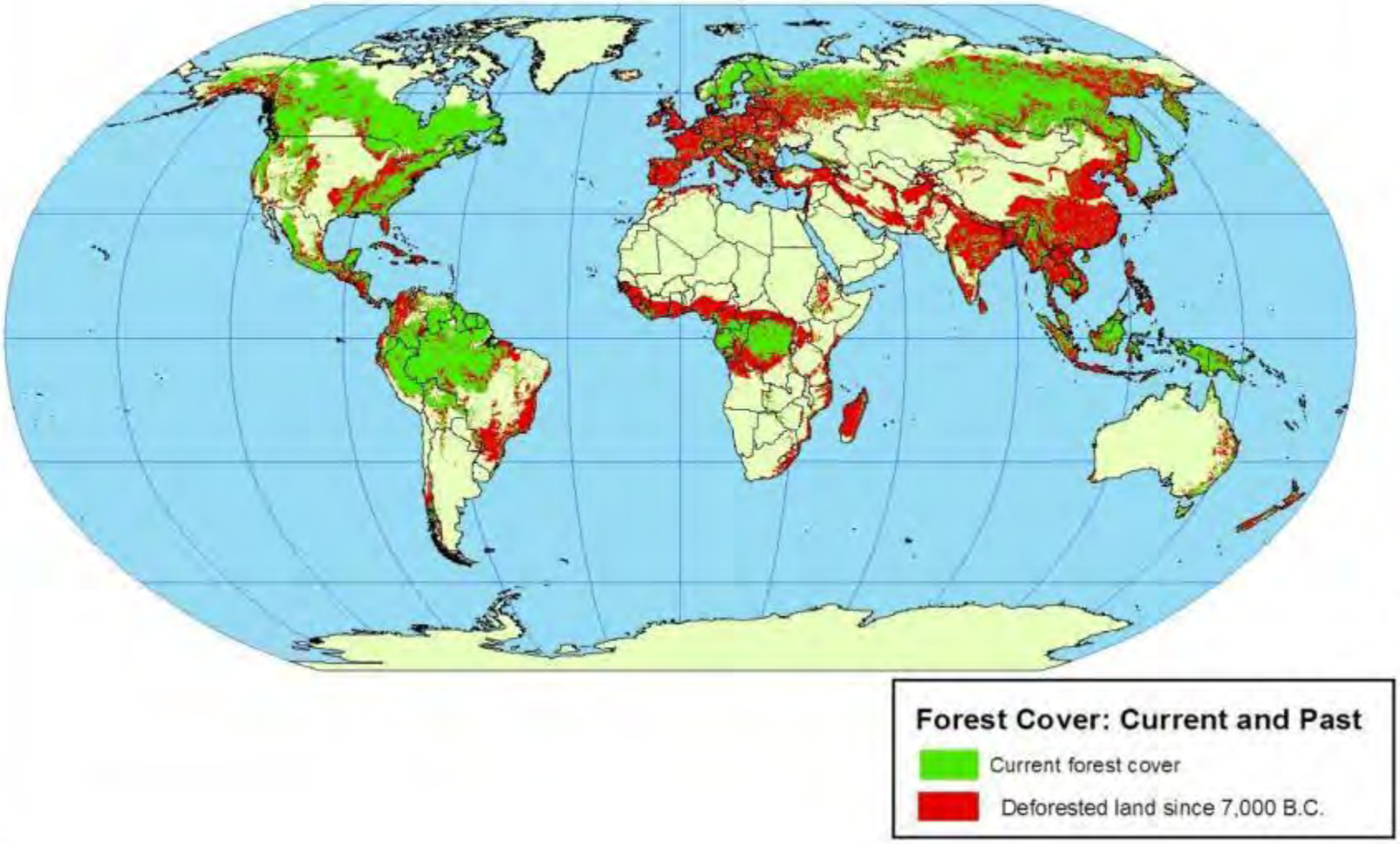
cef
Centre d'étude de la forêt

Plantations forestières, une relation … compliquée

Paquette, A., and C. Messier. 2009. The role of plantations in managing the world's forests in the Anthropocene. Frontiers in Ecology and the Environment 8(1): 27-34.

< 4 milliards ha de forêts restant (sur **8**)

1.5 (20%) sont ~ intactes



Dispatches

Paper giant says "no" to deforestation

Janet Pelley

Asia Pulp & Paper (APP) brought its bulldozers to a halt on February 1st and announced 4 days later that it will no longer log natural forests in Indonesia or anywhere else. The move by the world's third-largest paper company bodes well for endangered Asian fauna, while demonstrating that Asian corporations are ready to embrace environmental sustainability.

APP's new Forest Conservation Policy, which was brokered by The Forest Trust (TFT), a conservation group headquartered in Geneva, Switzerland, declares that the company will only use fiber sourced from plantation trees. TFT is currently identifying how much of APP's 2.5 million ha of holdings in Indonesia will be off-limits to development and which areas, such as degraded scrub land, could be converted to tree plantations. The policy also prohibits the company from developing peatlands or other carbon-rich ecosystems. All of APP's suppliers must comply with the new policy.

E Parker/TFT

Indonesia's Baram River frog wins a reprieve from habitat loss.

The policy owes its genesis to pressure from Greenpeace, WWF, and other environmental groups, says Scott Poynton, executive director of TFT. These organizations enlisted more than 100 major companies to stop buying paper products from APP. Meanwhile, APP determined that it had enough plantations to supply its needs and approached TFT in February 2012, saying that it was ready to conserve the remaining 250 000 ha of natural forest on the company's lands. "This decision is hugely significant for forests in Indonesia, which are home to important species such as tigers, elephants, and rhinos", Poynton adds.

Although APP has broken conservation promises before, "this time the company is serious", Poynton believes. Regardless, TFT intends to monitor APP closely; APP's products will be subjected to fiber testing using high-powered microscopes that can distinguish plantation fibers from mixed tropical hardwoods derived from natural forests, and TFT will use Global Forest Watch 2.0, a free software application to be launched in May by the World Resources Institute (WRI), which combines satellite images, maps, and data to generate forest clearing alerts in near-real-time.

"It's in the core business interest of companies like APP to make commitments to become more environmentally responsible", says Nigel Sizer, an ecologist with WRI (Washington, DC). Being perceived as an environmental pariah limits a company's customer base and makes it harder to obtain loans as more banks sign on to environmentally responsible financing practices, he continues. "This sets a precedent because if APP can do it, then any company can make its products without causing deforestation", Poynton concludes. ■

Sylviculture traditionnelle

Réduire la variabilité pour augmenter la capacité prédictive et l'efficacité

→ Concentrer productivité primaire

→Diversité réduite, surtout pour certain groupes fonctionnels

→Résilience réduite

→Capacité à fournir de multiples services réduite

Questions

- Quelle est la place des plantations forestières dans l'Anthropocène?
- Peuvent-elles se substituer à la forêt naturelle pour la production de bois (changement d'échelle)?

- Peut-on réduire leur impact, voir le rendre positif?
- Peut-on en augmenter la résilience?

- **Est-ce qu'on peut le faire?!**

REVIEWS REVIEWS REVIEWS

The role of plantations in managing the world's forests in the Anthropocene

Alain Paquette* and Christian Messier

The public view of tree plantations is somewhat ambiguous. While planting a single tree is generally considered good for the environment, planting a million trees raises concerns in some circles. Although plantations are often used to compensate for bad forestry practices, to willingly simplify otherwise complex forest ecosystems, or as a strategy for allowing the current petroleum-based economy to continue on its course, we believe plantations have a legitimate place in the sustainable management of forests. Multipurpose plantations, designed to meet a wide variety of social, economic, and environmental objectives, can provide key ecosystem services, help preserve the world's remaining primary forests, and sequester an important pro… atmospheric carbon released by humans over the past 300 years.

Front Ecol Environ 200…

The Earth is curr…

13 Managing tree plantations as complex adaptive systems

Alain Paquette and Christian Messier

Biodivers Co…
DOI 10.1007…

ORIGINAL PAPER

Plantation forests, climate change and biodiversity

S. M. Pawson · A. Brin · E. G. Brockerhoff · D. Lamb · T. W. Payn · A. Paquette · J. A. Parrotta

AP…
T…

…proach to forest manage…
…the overall goal of …
…imenting w…
…t. F…

…ding the forest into 3 zones, each with its own management …
…mic sustainability of the forest. For the past …
…, incorporating social interests into the orig…
…proach is economically viable, socially accept…
…ne, thus far the consensus among the …
…f Canada.

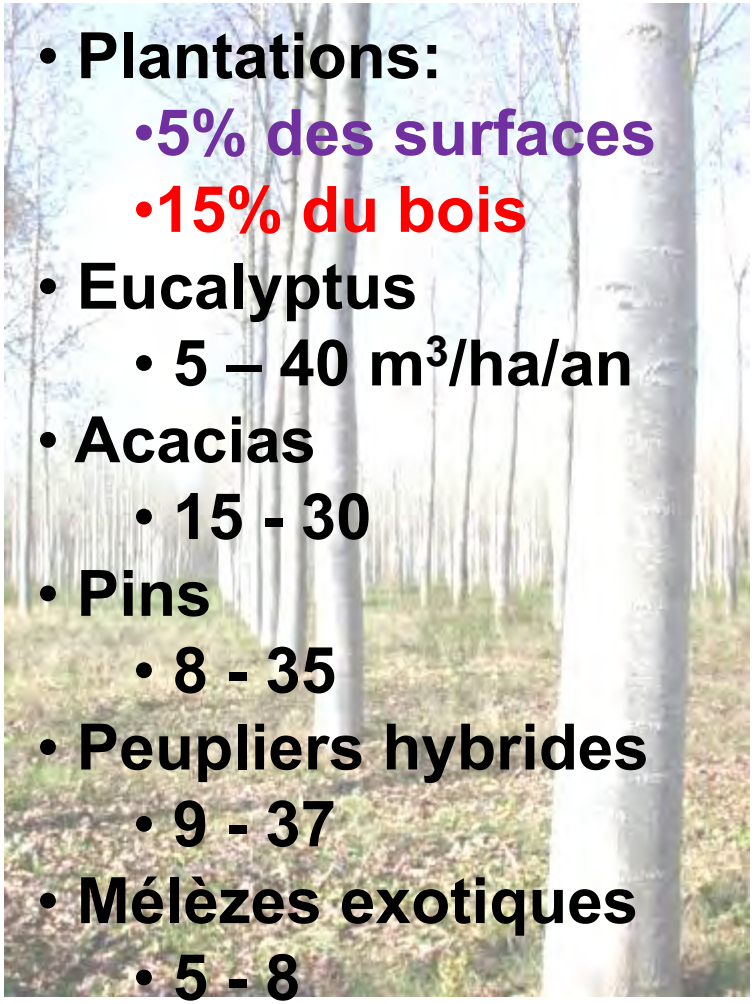
…tural disturbance …
…stry, green…

TRIAD zoning in Quebec: Experiences and results after 5 years

by Christian Messier[1], Rebecca Tittler[1], Daniel D. Kneeshaw[1], Nancy Gélinas[2], Alain Paquette[1,3], Kati Berninger[1], Héloise Rheault[1,3], Philippe Meek[4] and Nadyre Beaulieu[3]

Plantations versus forêts, la suite…

- Forêts naturelles
  - <1 – 3 m^3/ha/an
- Reforestation après coupe, Canada, USA, Scandinavie
  - 2 – 7 m^3/ha/an



- Plantations:
  - 5% des surfaces
  - 15% du bois
- Eucalyptus
  - 5 – 40 m^3/ha/an
- Acacias
  - 15 - 30
- Pins
  - 8 - 35
- Peupliers hybrides
  - 9 - 37
- Mélèzes exotiques
  - 5 - 8

Protection par le zonage fonctionnel

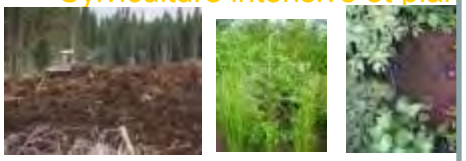
TRIAD … ine)

Zonage … zones

~20%

Zone de productio…

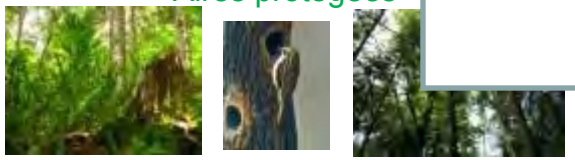
Sylviculture intensive et plan…

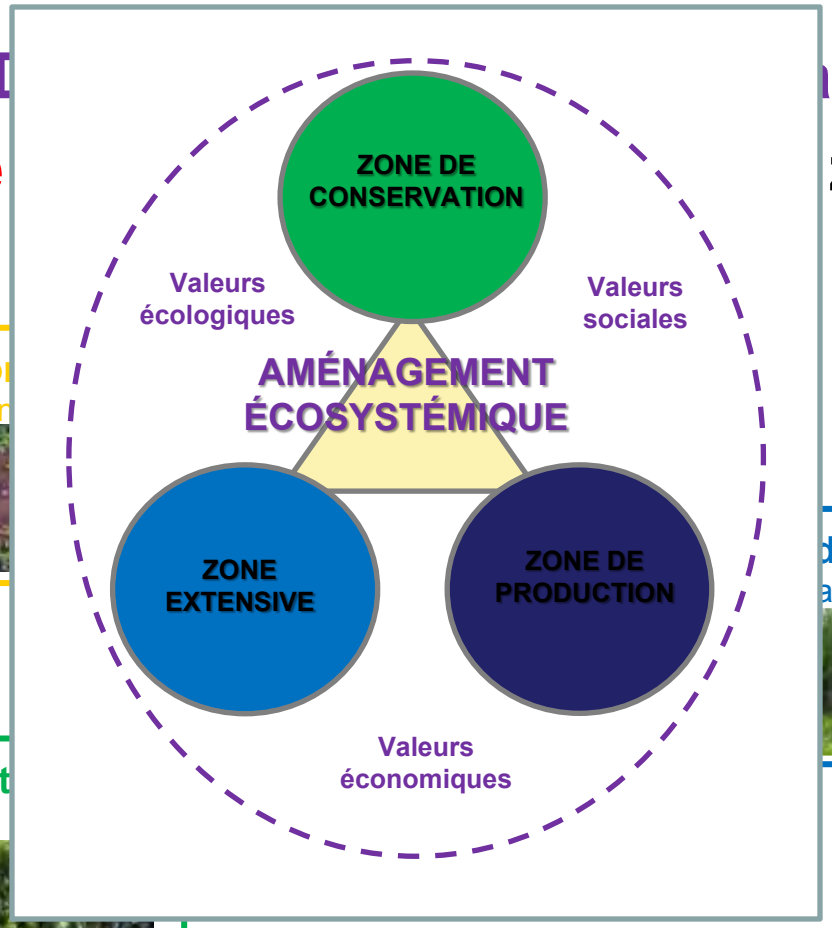


~10%

Zone de conservat…

Aires protégées

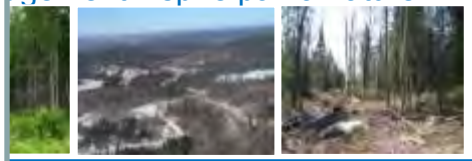




~70%

…d'aménagement extensif

…agement inspiré par la nature



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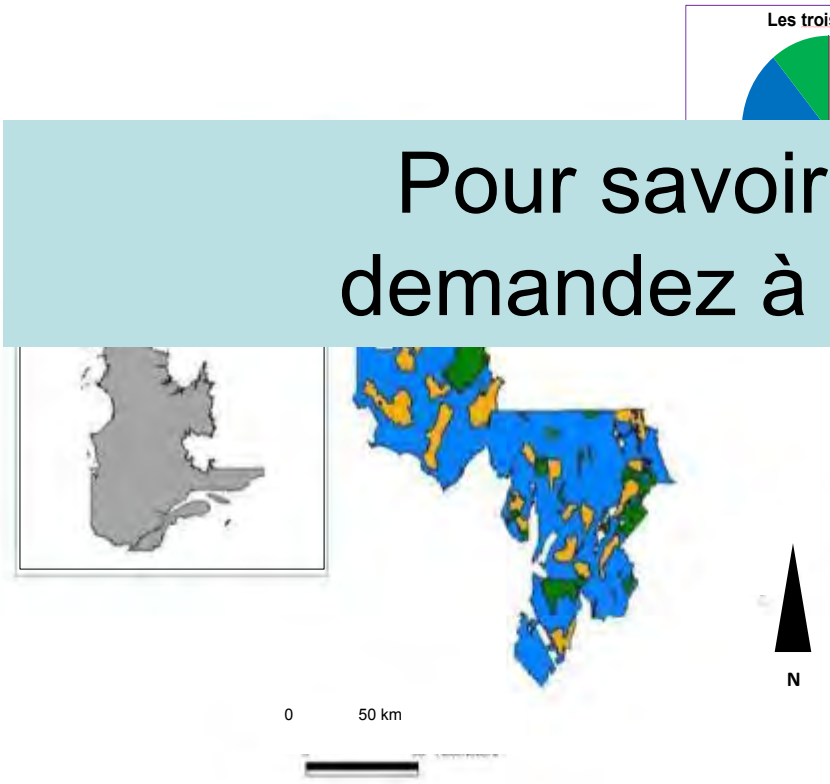
Le projet TRIADE



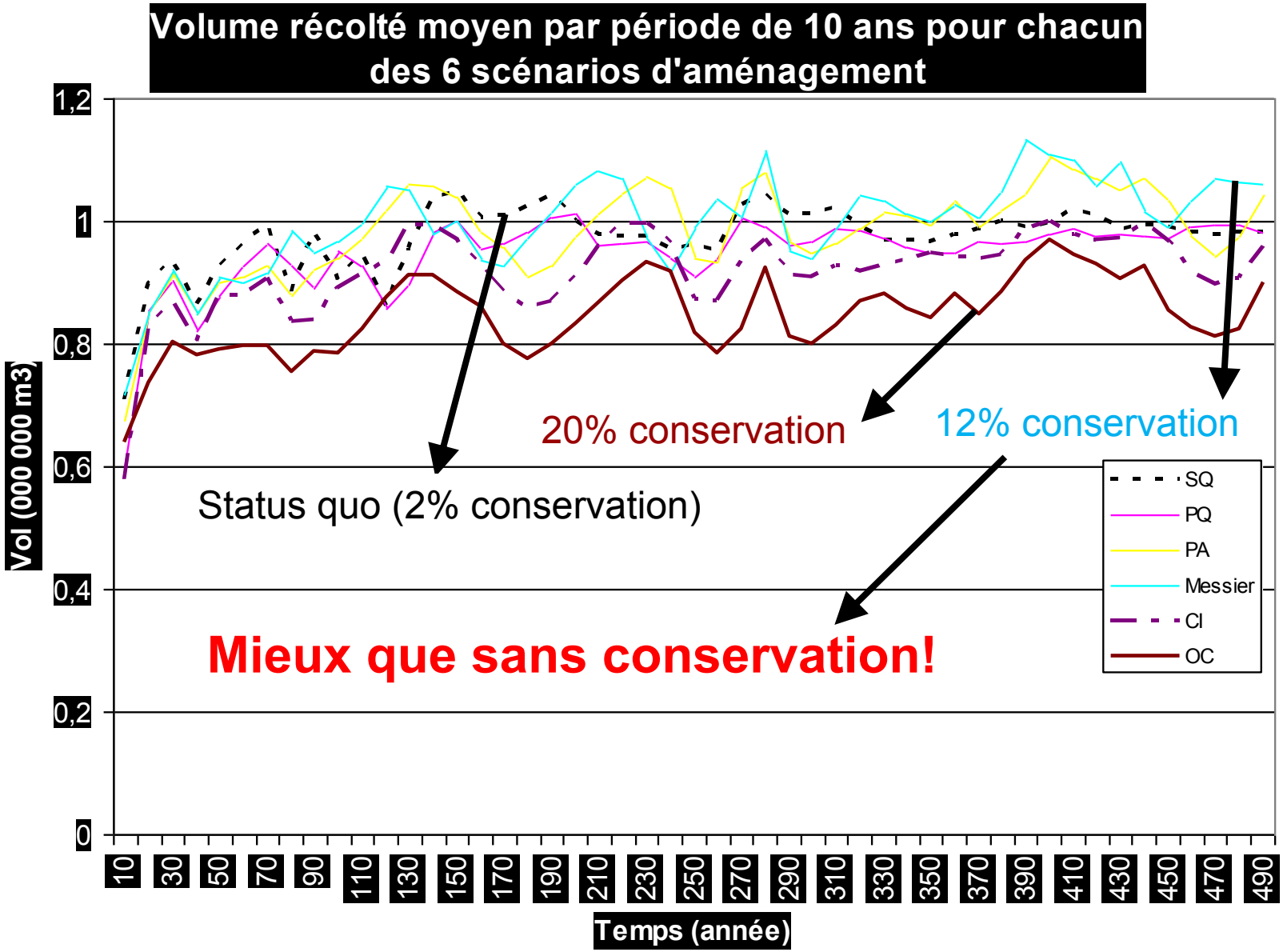
- **UAF 42-51 en Haute-Mauricie**

Pour savoir où les mettre, demandez à Marc et Martin!!

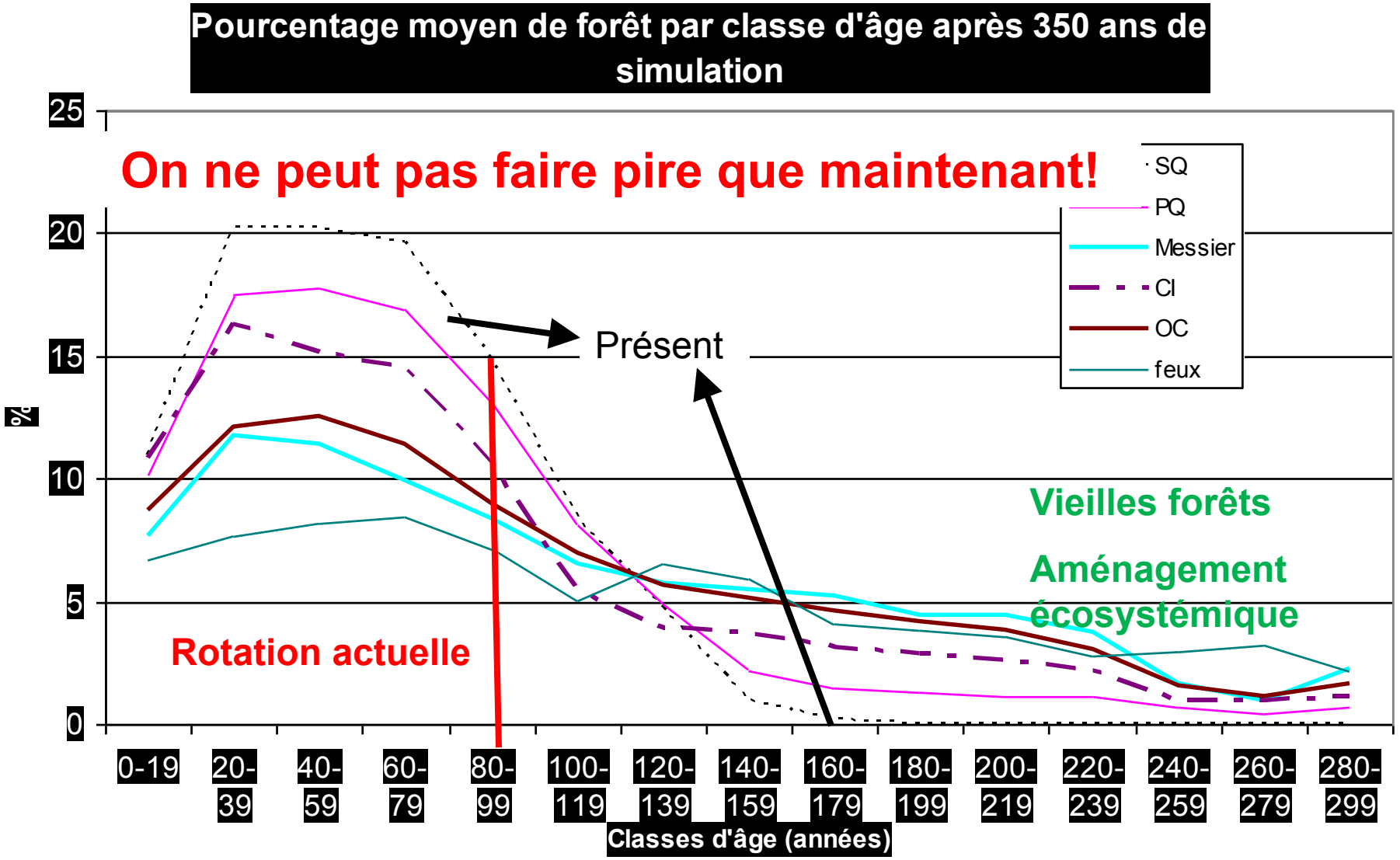
au complet

- **Initié en 2003. Projet pilote depuis 2005**

Simulations : volumes récoltés



Simulation : structure d'âge



Côté, P., R. Tittler, C. Messier, D. D. Kneeshaw, A. Fall, and M.-J. Fortin. 2010. Comparing different forest zoning options for landscape-scale management of the boreal forest: Possible benefits of the TRIAD. Forest Ecology and Management 259:418-427.

Tittler, R., C. Messier, and A. Fall. 2012. Concentrating anthropogenic disturbance to balance ecological and economic values: applications to forest management. Ecological Applications 22:1268-1277.

ECOLOGY LETTERS

Global food demand and the sustainable intensification of agriculture

David Tilman[a,1], Christian Balzer[b], Jason Hill[c], and Belinda L. Befort[a]

[a]Department of Ecology, Evolution, and Behavior, University of Minnesota, St. Paul, MN 55108; [b]Department of Ecology, Evolution, and Marine Biology, University of California, Santa Barbara, CA 93106; and [c]Department of Bioproducts and Biosystems Engineering, University of Minnesota, St. Paul, MN 55108

Contributed by David Tilman, October 12, 2011 (sent for review August 24, 2011)

Global food demand is increasing rapidly, as are the environmental impacts of agricultural expansion. Here, we project global demand for crop production in 2050 and evaluate the environmental impacts of alternative ways that this demand might be met. We find that per capita demand for crops, when measured as caloric or protein content of all crops combined, has been a similarly increasing function of per capita real income since 1960. This relationship forecasts a 100–110% increase in global crop demand from 2005 to 2050. Quantitative assessments show that the environmental impacts of meeting this demand depend on how global agriculture expands. If current trends of greater agricultural intensification in richer nations and greater land clearing (extensification) in poorer nations were to continue, ~1 billion ha of land would be cleared globally by 2050, with CO_2-C equivalent greenhouse gas emissions reaching ~3 Gt y^{-1} and N use ~250 Mt y^{-1} by then. In contrast, if 2050 crop demand was met by moderate intensification focused on existing croplands of underyielding nations, adaptation and transfer of high-yielding technologies to these croplands, and global technological improvements, our analyses forecast land clearing of only ~0.2 billion ha, greenhouse gas emissions of ~1 Gt y^{-1}, and global N use of ~225 Mt y^{-1}. Efficient management practices could substantially lower nitrogen use. Attainment of high yields on existing croplands of underyielding nations is of great importance if global crop demand is to be met with minimal environmental impacts.

Keywords

Biodiversity, conservation, easement, land use, protected area, restoration, sustainable agriculture, trade-off, wildlife-friendly farming, yield

for crop calories and crop protein for each nation for each year based on national annual yields, production, imports, and exports of 275 major crops (those crops used as human foods or livestock and fish feeds) (Table S2). The resultant per capita demand for calories or protein from all food or feed crops combined (*SI Materials and Methods*) encompasses annual human crop consumption, crop use for livestock and fish production, and all losses (waste and spoilage during food and crop production, storage, transport, and manufacturing). To determine long-term global trends and better control for economic differences among nations, nations were aggregated into seven economic groups ranging from highest (Group A) to lowest (Group G) national average per capita real (inflation-adjusted) gross domestic product (GDP) (Table S1).

Results and Discussion

Global Crop Demand. Analyses reveal a simple and temporally consistent global relationship between per capita GDP and per capita demand for crop calories or protein. Across all years, per capita crop use was similarly dependent on per capita GDP both within and among the seven economic groups (Fig. 1). The magnitude of this dependence is surprisingly large. In 2000, for example, per capita use of calories and protein by the richest nations (Group A) were 256% and 430% greater, respectively, than use by the poorest nations (Groups F and G). These large

SUSTAINABILITY SCIENCE

Quels sont les enjeux pour les plantations TRIADE?

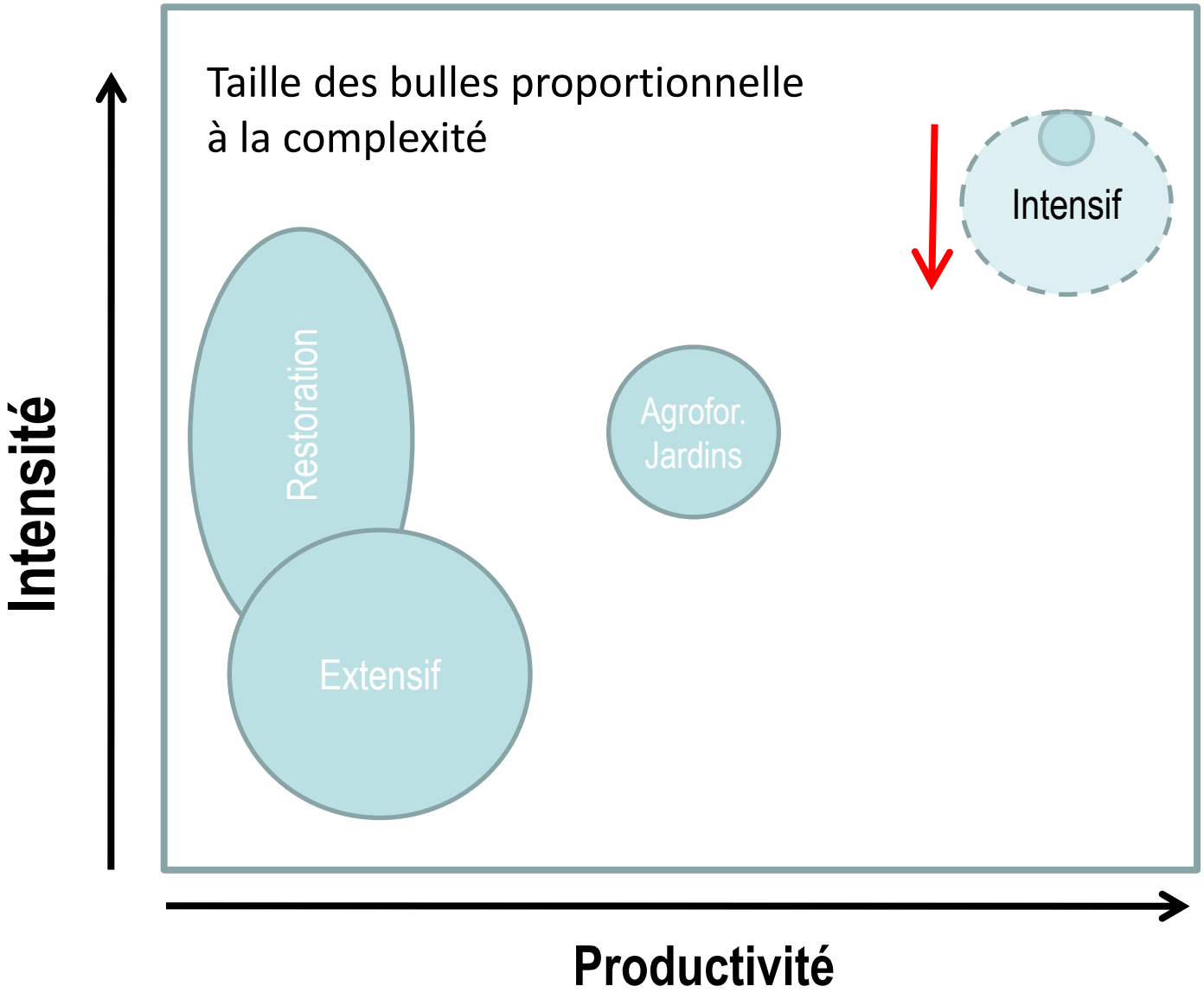
- **Arrêter de faire des plantations de chercheur et passer à l'opérationnel ☺**

- **Trouver suffisamment de terrain (500 ha / année)**

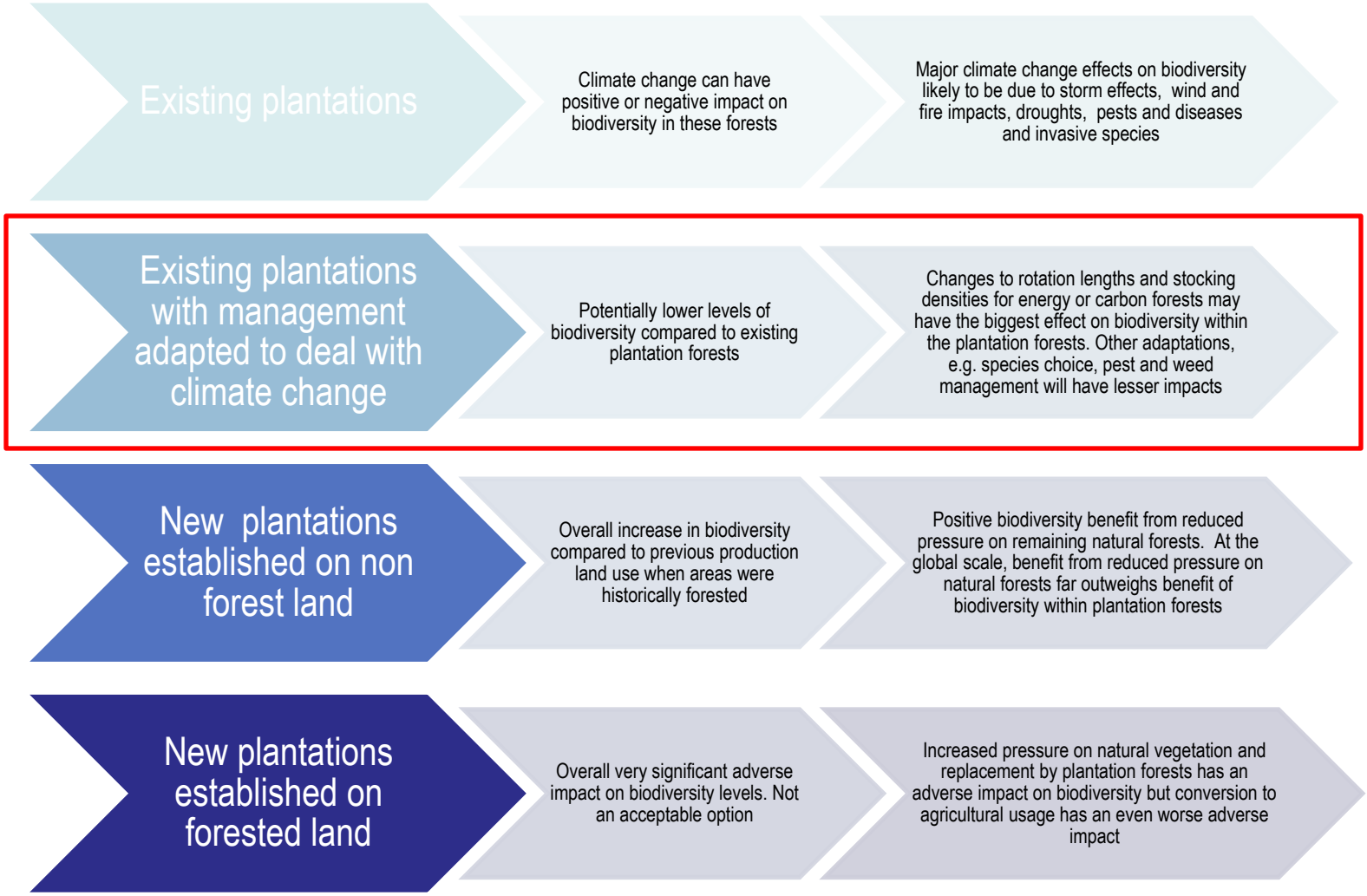
- **Garantir un niveau de rendement pour l'atteinte des objectifs de zonage, et diminuer les coûts et impacts (Mario et Nicolas)**

- **Rendre les plantations plus acceptables socialement, augmenter leur résilience**

- **Changement d'échelle, du peuplement au paysage**
  - Ne laissez pas la plantation cacher la forêt!



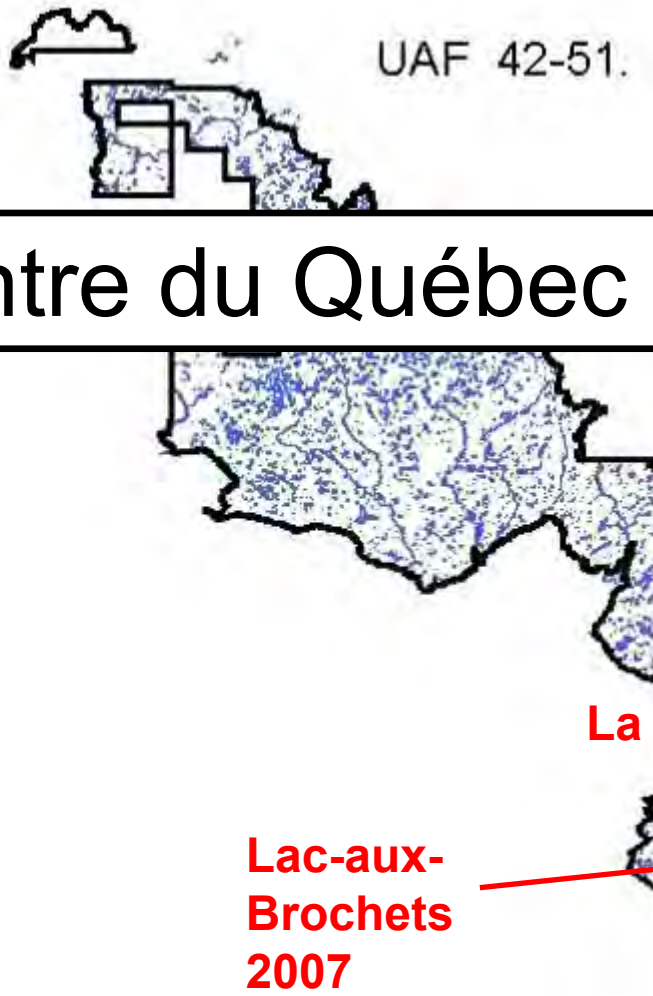
Paquette, A. and C. Messier. 2013. Chapter 13 - Managing Tree Plantations as Complex Adaptive Systems. *in* C. Messier, K. Puettmann, J., and K. D. Coates, editors. Managing forests as complex adaptive systems: Building Resilience to the Challenge of Global Change. EarthScan (January 2013), New York.



Pawson, S. M., A. Brin, E. G. Brockeroff, D. Lamb, D. B. Lindenmayer, T. W. Payn, A. Paquette, and J. A. Parrotta. 2013. Plantation forests, climate change and biodiversity. Biodiversity and Conservation.

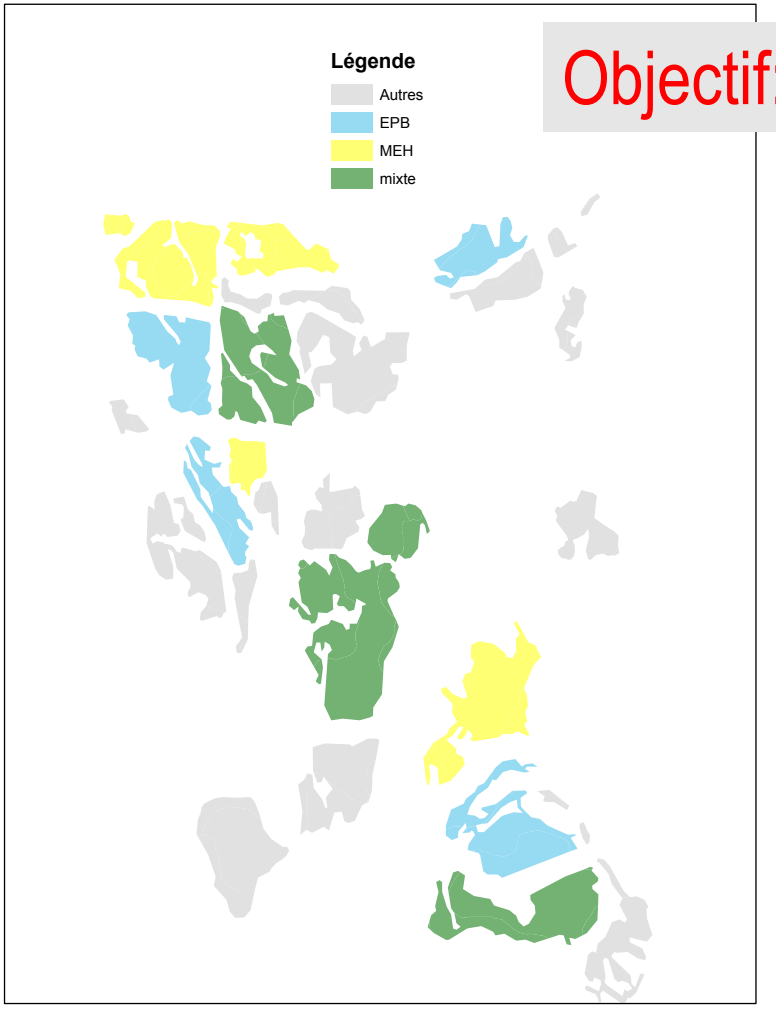
Survol des dispositifs de recherche

Fiches RLQ disponibles



Centre du Québec / Victoriaville : 2013!!

Bessonne (2007-8)



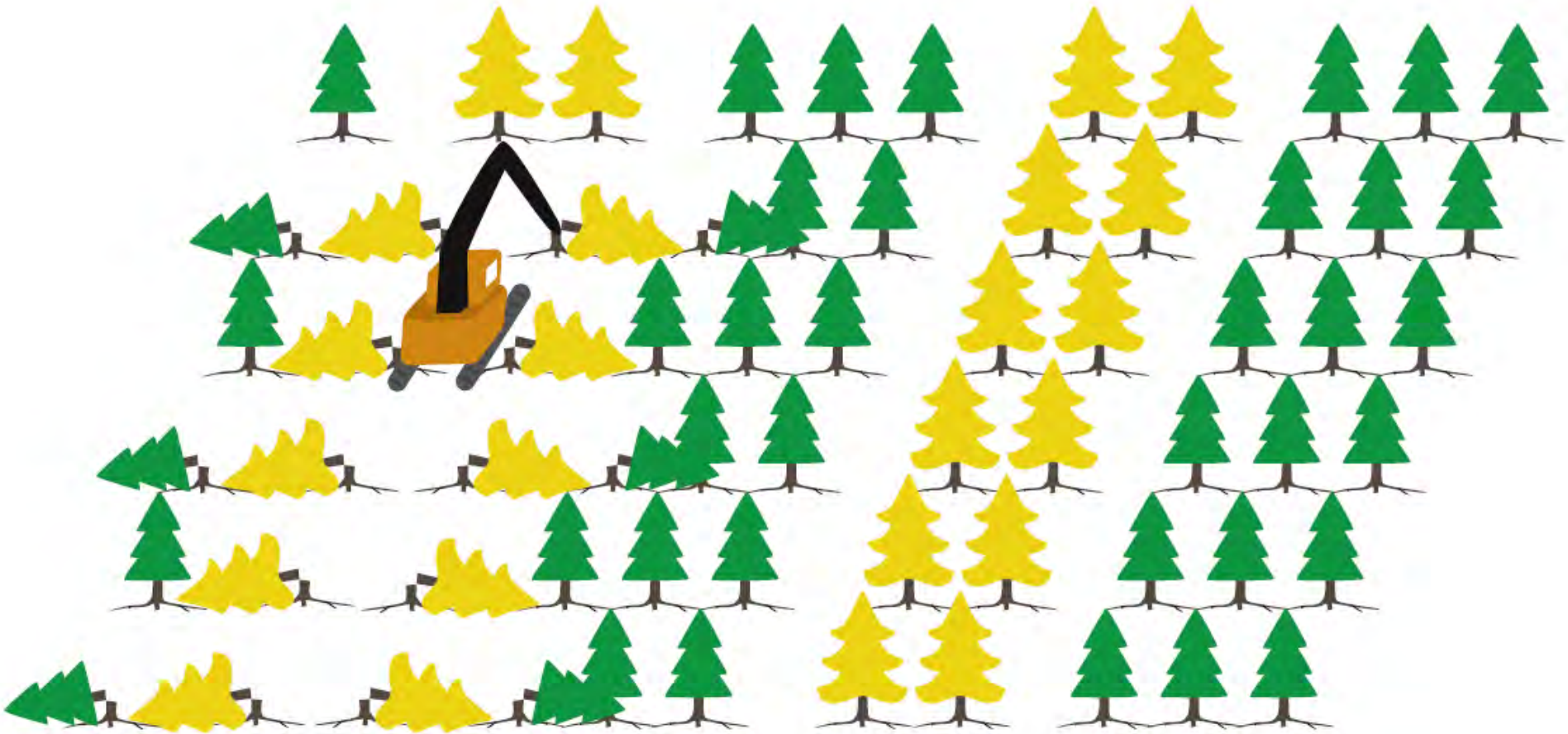
Objectif: rendre ces idées opérationnelles! ☺

Mélèze hybride en monoculture (3x2)

Épinette blanche en monoculture (2x2)

Plantation mixte
MEH 3x2 et EPB 2x2

Plantation mélangée mélèze – épinette → 1re récolte

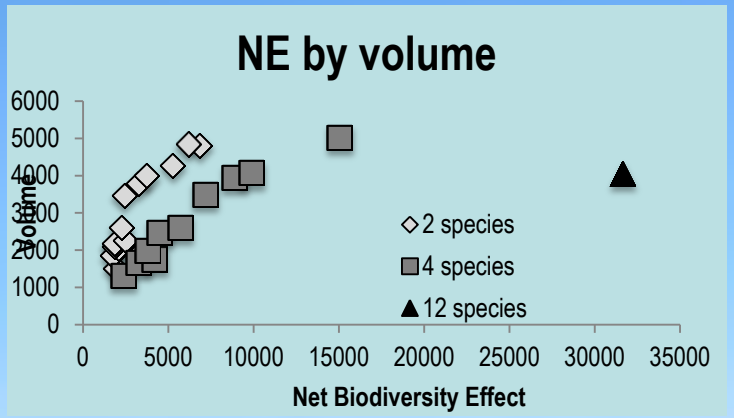


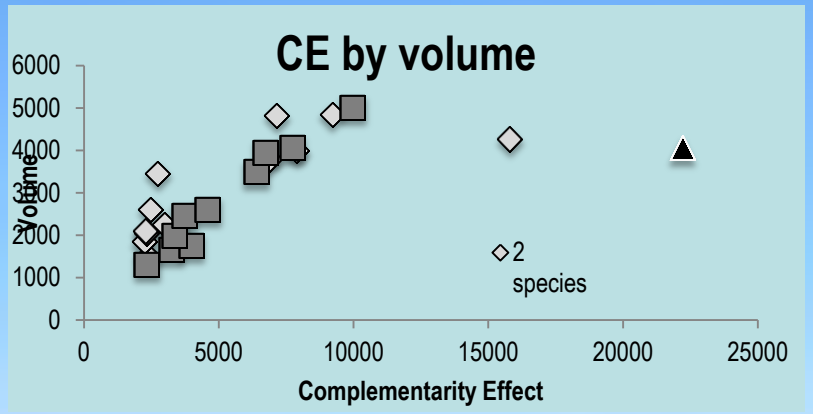
|---------- 9 ----------|

Urgent besoin de dispositifs **opérationnels** de démonstration, et de recherche!

Paquette, Messier (2013). Managing Tree Plantations as Complex Adaptive Systems. In: Messier, Puettmann, Coates (eds) Managing forests as complex adaptive systems: Building Resilience to the Challenge of Global Change. EarthScan, New York

Merci!


NE by volume
6000
5000
4000
3000
2000
1000
0
Volume
0
5000
10000
15000
20000
25000
30000
35000
Net Biodiversity Effect
2 species
4 species
12 species


CE by volume
6000
5000
4000
3000
2000
1000
0
Volume
0
5000
10000
15000
20000
25000
Complementarity Effect
2
species