

**Change production systems :
short-rotation conifers, SRC, mix SRC-high forest**

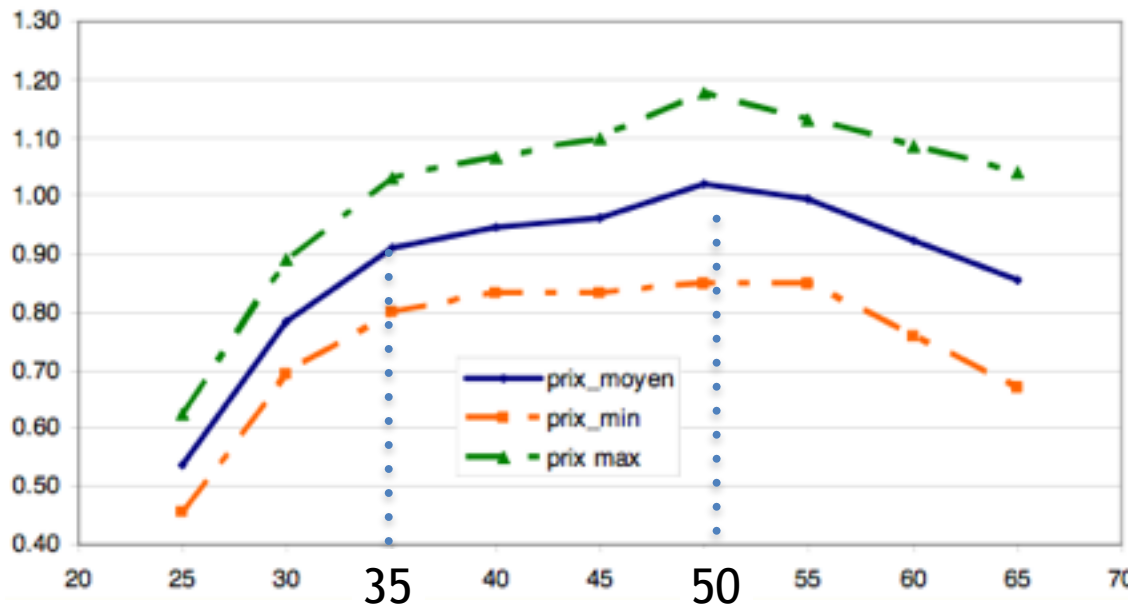
**Increase carbon flux / hectare :
create and use improved genetic material
(productivity is no longer secondary)**

**Test of hybrid poplar clones
for SRC**

**Source : C. Bastien & G. Bodineau
(INRA Orléans)**

Example of forest-industries co-adaptation : shortened rotations in conifers

Selling price/m³ (relative units)



Fir-Spruce - Vosges
mean (sept. 2009-sept. 2010)

Source : ONF
(Gamblin, 21/3/2011)

BH diameter (cm)

90%
of Max

Opportunity of shorter rotations :

- ▶ *reduce abiotic risks*
- ▶ *supply closer to industrial demand*
- ▶ *increase fluxes and flexibility*

Need more management planning & integrated multi-scale management

Poplar (high forest)
SRC Poplar
Mix (HF-SRC)

Multi-purpose,
« mainstream »
management

National parks,
natural reserves,
recreation areas

Fast-growing conifers :
Douglas fir, hybrid larch

Specialization :
products

Land use planning, forest policy : specialize functions in space,
e.g. « Triad » (USA, UK)

Natural regeneration

Very short
cycle

Standard
rotation

Assisted
migration

Plant other
Oak spec.

Plant exotic
spec.

Example : diversify regeneration options in Oak management

Very short
cycle

Standard
rotation

Delayed
harvesting

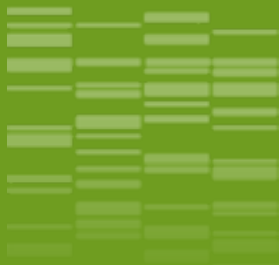
Natural
reserve

Example : diversify rotation ages in Beech management

Improve resilience
through :

...genetic
res. mgt

...prevent
abiotic
damages



« La bioéconomie suppose une *anthropisation réussie* de la biosphère »
(Michel Griffon, 5 mai 2015, restitution prospective UE SCAR-4)

≈ « Bioeconomy needs a *successful anthropisation* of biosphere »

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Ecological intensification :
coupled cycles of matter/energy/information,
acknowledged effort to transform (manage, learn
by monitoring and science, improve)

Bioeconomy : circular processes/flows



LE PROJET FORÊT-BOIS pour la France

France Bois Forêt (FBF) et France Bois Industries Entreprises (FBIE) sont à l'initiative du

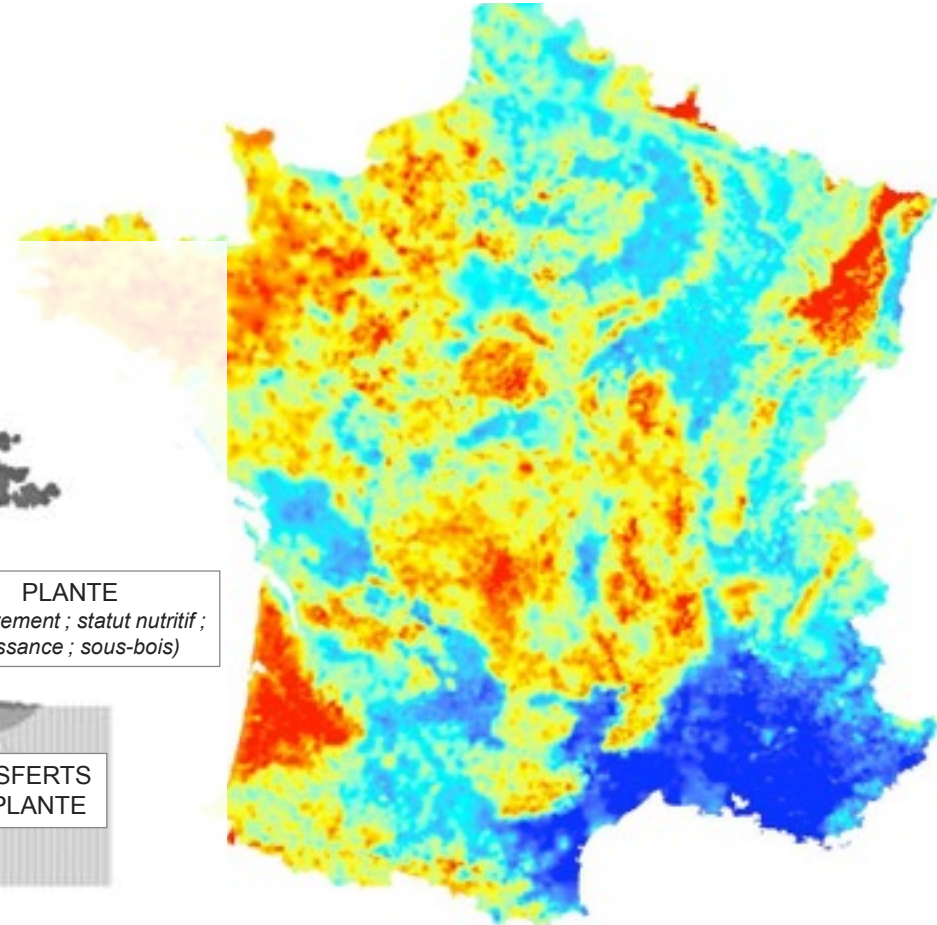
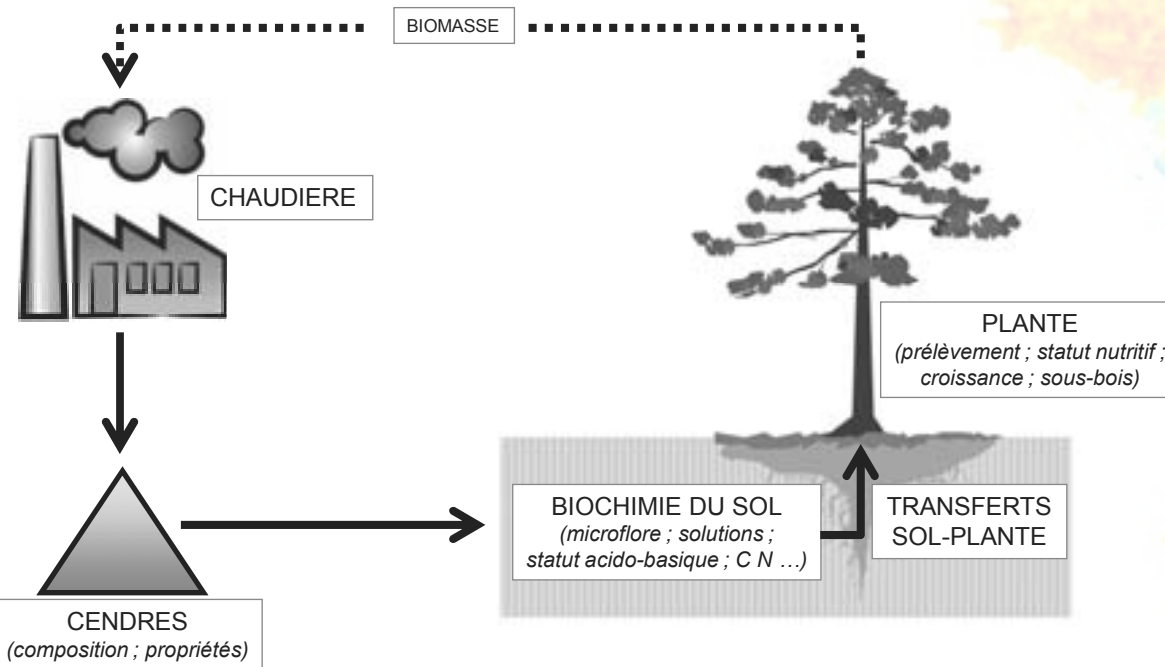


Optimized cycles of biomass :
 look for efficiency, reduce leakage,
 use the ≠ tissues at their best potential,
 re-use

Illustration: Kevin Jacquot

Recycle exported nutrients back to forests, possible strategies of flux limestones → acid soils

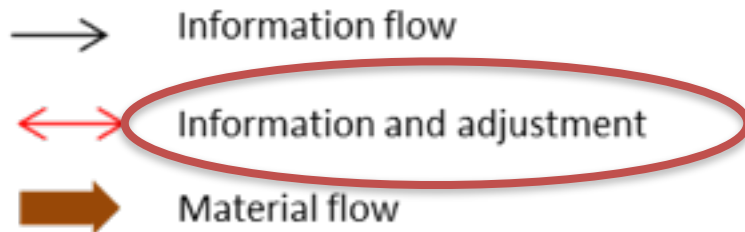
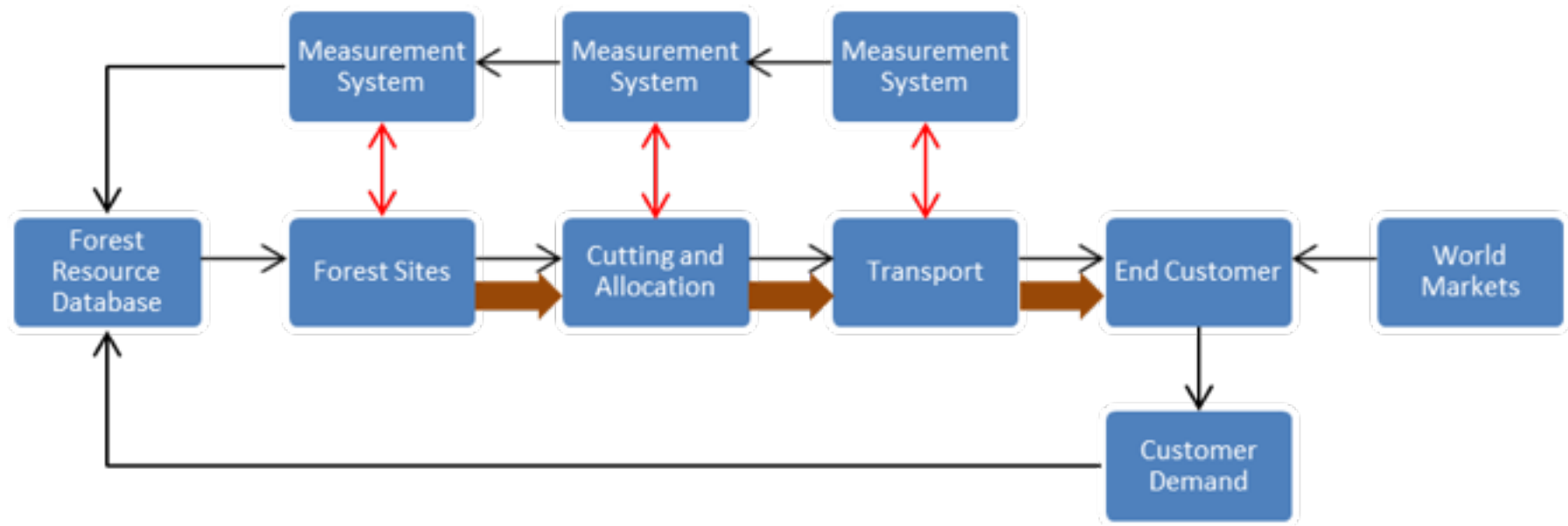
Restitution or recycling of firewood ashes



Carte de France du pH des sols forestiers,
échelle 1km, ©IFN, LERFoB

Source : Augusto et al. (2014) - Les intrants sont-ils nécessaires pour développer durablement la fonction de production ?

Integrated forest logistics : make a better use of information linked to production process



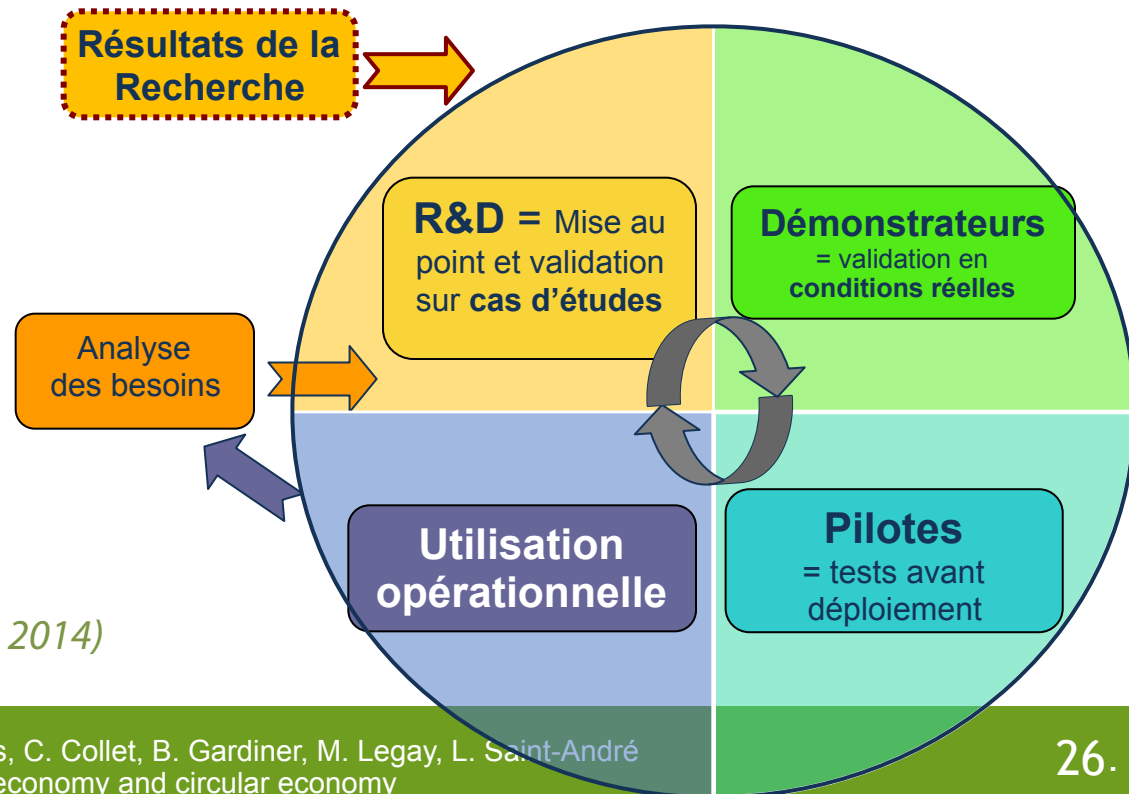
Adjustement-regulation : a major feature of ecological systems

Source : Barry Gardiner (25/1/2015)

Innovation through learning loops



- ❖ Make a step-forward beyond linear technology-transfer of platform CAPSIS :
 - Transfer methods, not only knowledge - case of remote sensing
 - Check robustness
 - Validate in industrial context
 - Handbooks, tools...



Source : ONF (Anne Jolly & Myriam Legay, 2014)



Conclusions

- ❖ Transition of sustainable management & climate challenges :
 - ❖ detect/analyze damages, anticipate large-scale **crises**
 - ❖ **use** existing forests (**more !**) and **plant**
 - ❖ reduce transaction costs (integration, **contracts**)
 - ❖ optimize the world's **use** of fibres and energy
 - ❖ forest soils : **+ targeted & + efficient use**
- ❖ Which questions arises ecological intensification ?
 - ❖ cycles embed ecosystems-human artifacts : **precaution**
 - ❖ **manage together** climate risks & impacts of practices
 - ❖ **information & planning** : monitor, control, correct, diversify, make explicit arbitrages ; optimization and viability
 - ❖ **combine** ecological/social/organisational **resiliences** (multi-scale)



谢谢你的关注

Obrigado

Gracias

Thank you

Merci

Forêt domaniale de Fontainebleau

nov. 2015

*« La bioéconomie suppose une anthropisation réussie de la biosphère »
(Michel Griffon, 5 mai 2015, restitution prospective UE SCAR-4)*