

AGROPARISTECH

CEMAGREF

CNPPF

CIRAD

CNRS

FCBA

INRA

ONF

IRD

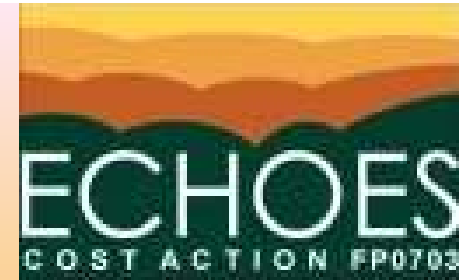
IFN

Expected climate change and  
options for European  
silviculture  
Uncertainty and forest  
policy making

by Jean-Luc PEYRON



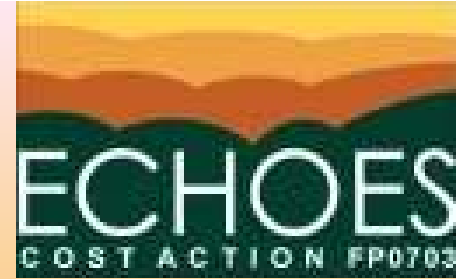
# Background



- # Climate change: a major concern for forestry
  - # [deforestation is a large source of Greenhouse gases]
  - # Forestry can partly mitigate climate change
  - # Forests are threatened by climate change (sensitivity to climate, delay for adaptation)
  - # Three issues: impacts, adaptation, mitigation
  - # Linked and global issues
- # COST action FP0703: Expected Climate change and Options for European Silviculture (ECHOES)
- # Climate change requires a broad response
  - # not only mitigation but also adaptation
  - # not only prediction but also management of uncertainty
  - # In the frame of sustainable forest management.



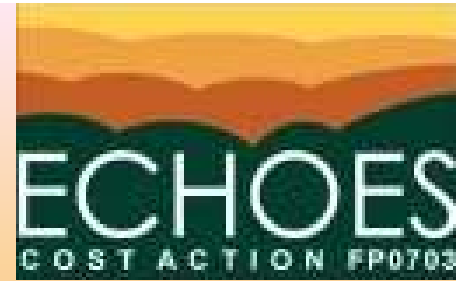
# Contents



- # What is ECOFOR?
- # What is COST?
- # What is ECHOES?
- # Uncertainties and climate change
- # Uncertainty and forest strategies



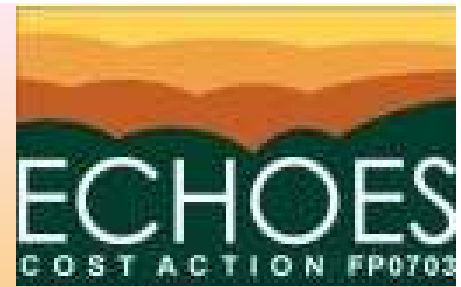
# What is ECOFOR? (1/2)



- # A common home for forest management and research
- # Members are acting in:
  - # Research
  - # Forest extension and management
  - # Forest monitoring
  - # Higher education
- # Governmental supports
  - # Research
  - # Agriculture
  - # Ecology (energy and sustainable development)
- # Zones concerned
  - # Temperate
  - # Tropical



# What is ECOFOR? (2/2)



## + Activities:

- + Expertise (resolution of practical questions)
- + Foresight studies and research needs
- + Research coordination and networking
- + Results dissemination, training, communication

## + Themes:

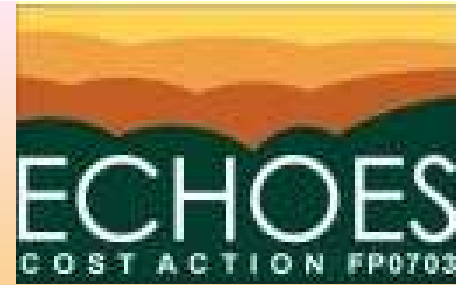
- + Ecosystem functioning and dynamics
- + Information systems
- + Sustainable forest management

## + Some topics

- + Risk assessment and management (storm, drought...)
- + Climate change: impacts, adaptation, mitigation
- + Biodiversity and forest management



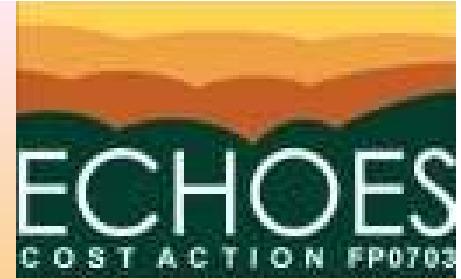
# What is COST? (1/1)



- + A means to enhance co-operation among scientists, researchers (and stakeholders)
  - + in Europe and beyond
  - + by the way of meetings and short missions
- + An intergovernmental framework
- + Supported by the European Commission (EC)
- + Managed by the European Science Foundation (ESF)
- + 9 domains among which "Forests, their products and services" (FPS)
- + Open calls for actions (2 per year)
- + About 4-5 new FPS actions each year
- + Duration about 4 years
- + About 15-20 ongoing FPS COST actions



# What is ECHOES? (1/8)

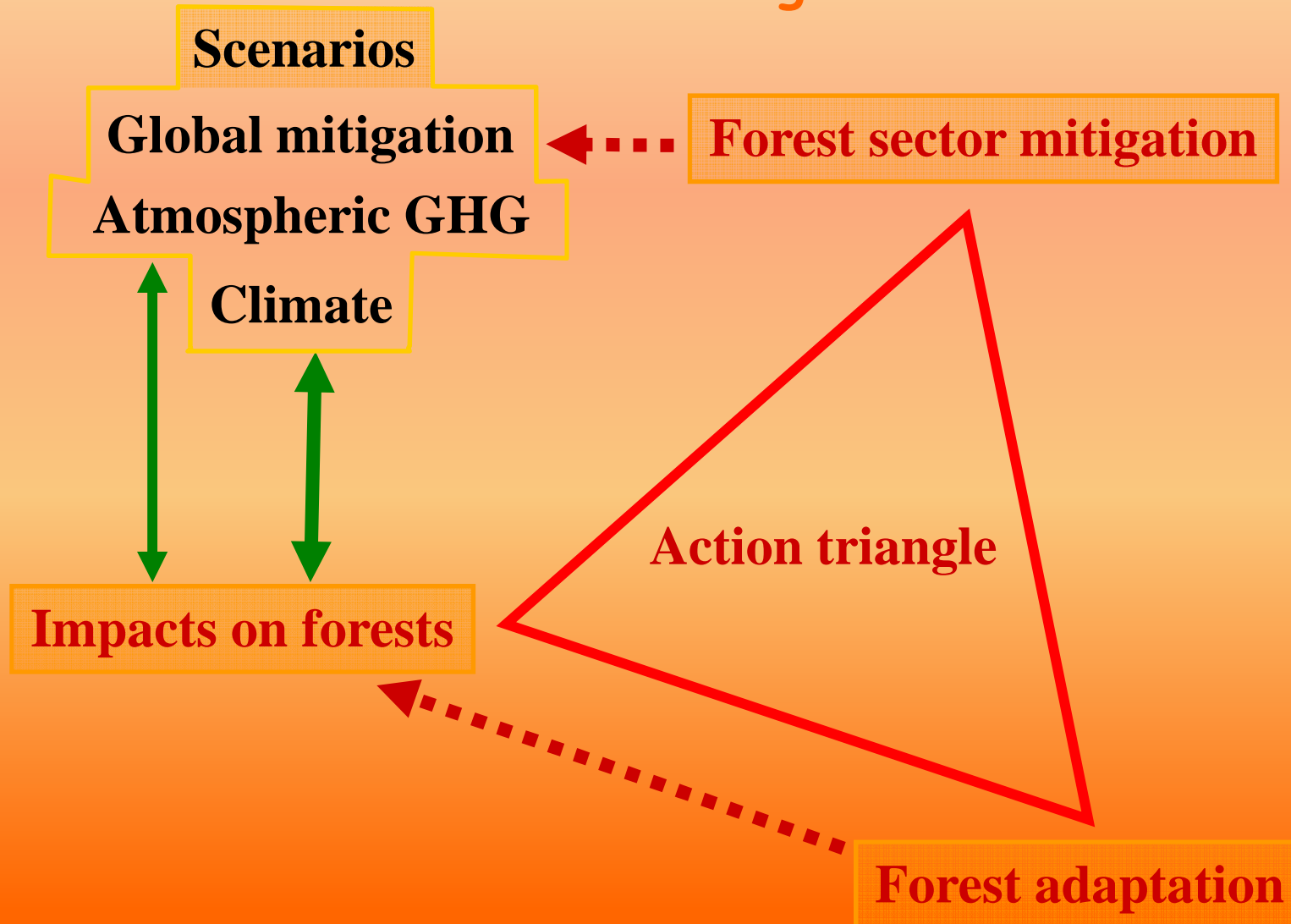


## Objectives

- # Main objective:
  - # to mobilize and integrate existing scientific knowledge on expected climate change for European forest policy makers and managers (→ forest management and policy)
- # Secondary objective:
  - # To identify future research and development needs (→ monitoring and research)
- # Other objectives:
  - # To contribute to IPCC Assessment Report nb5 (AR5)
  - # To supply a European perspective for the second commitment period after Kyoto Protocol

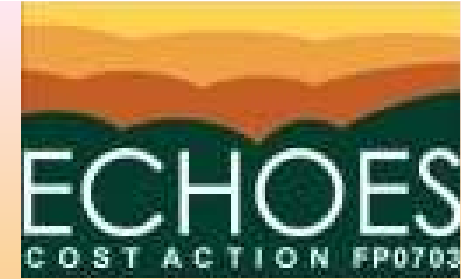
# What is ECHOES? (2/8)

Action triangle





# What is ECHOES? (3/8)

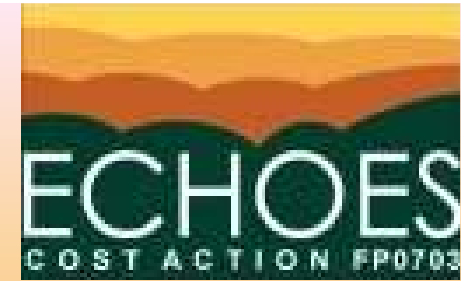


## Main structure of the Action

IPCC 4th Assessment report	The Action Triangle
The physical science basis	
Impacts, adaptation, vulnerabilities	Impacts (WG1) Adaptation (WG2)
Mitigation	Mitigation (WG3)



# What is ECHOES? (4/8)

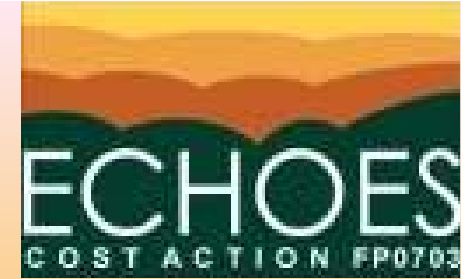


## Transversality in the Action

	Impacts	Adaptation	Mitigation
<b>Interactions</b>	Impacts Adaptation		
	Vulnerability		Mitigation
<b>Regional specificities</b>	mediterranean		
	alpine		
	atlantic		
	continental		
	nordic		
	Rest of the world (North America, ...)		



# What is ECHOES? (5/8)

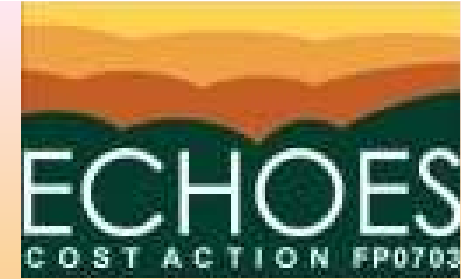


Continuous improvement process





# What is ECHOES? (6/8)



Evaluation criteria



**Biodiversity**

**Production**  
(wood & carbon)

**Multifunctionality**

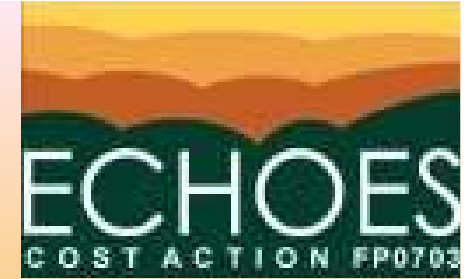


**Forest status:**  
recreation and tourism  
soil & water protection





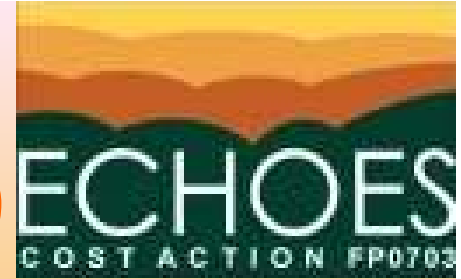
# What is ECHOES? (8/8) Outputs



ACTIVITIES AND OUTPUTS		Yr 1	Yr 2	Yr 3	Yr 4
Forest synthesis of IPCC		■			
Country reports	WG I to III	■	■	■	■
	Case studies § IV	■	■	■	■
Key issues	WG I to III	■	■	■	■
	transversal issues		■	■	■
Recommendations for	policy & management		■	■	■
	monitoring and research		■	■	■
Website		■	■	■	■
Newsletters	for ECHOES sympathizers	■	■	■	■
	for decision makers	■	■	■	■



# Uncertainties and climate change (1/11)



## General sources of uncertainty

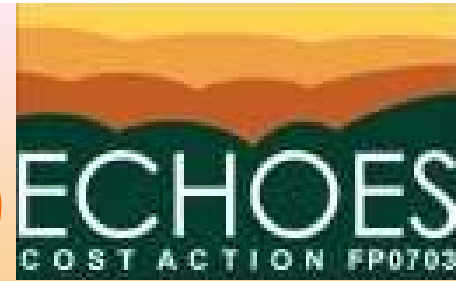
- + Complexity of phenomena
  - + Because of natural complexity
  - + Because of social complexity
- + Space and time implications
- + Number of factors
- + Interactions and feedbacks, intersectoral relationship
- + Some factors cannot be predicted
- + Thus, a general lack of knowledge that
  - + can be partly filled
  - + will partly remain

## Past impacts

- ✦ Observed phenomena depend on several factors
- ✦ Attribution to climate change is not easy
- ✦ Examples :
  - ✦ Increase of productivity due to T, CO<sub>2</sub>, N depositions
  - ✦ Invasive species due to land-use change, globalization (trade), climate change

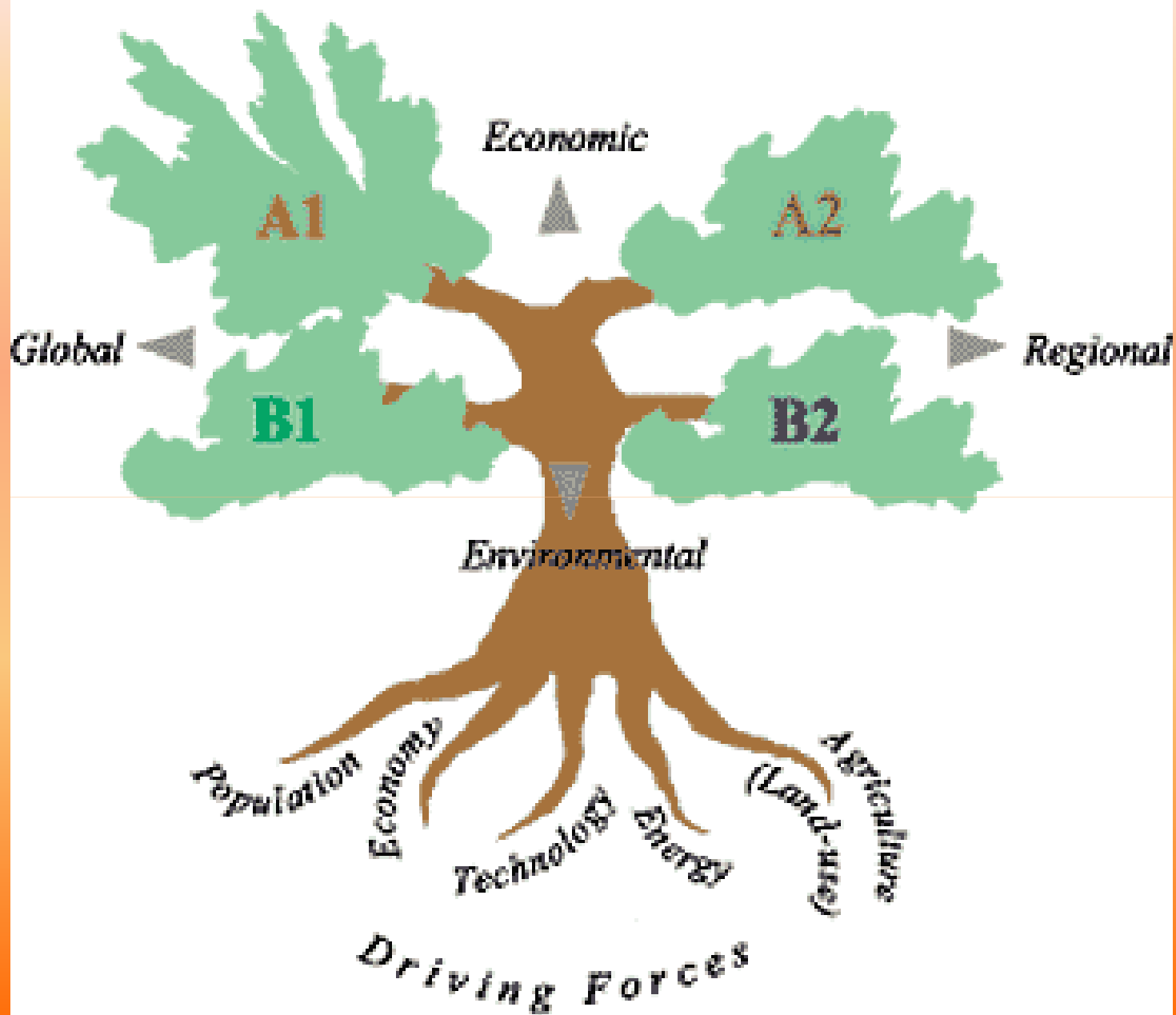


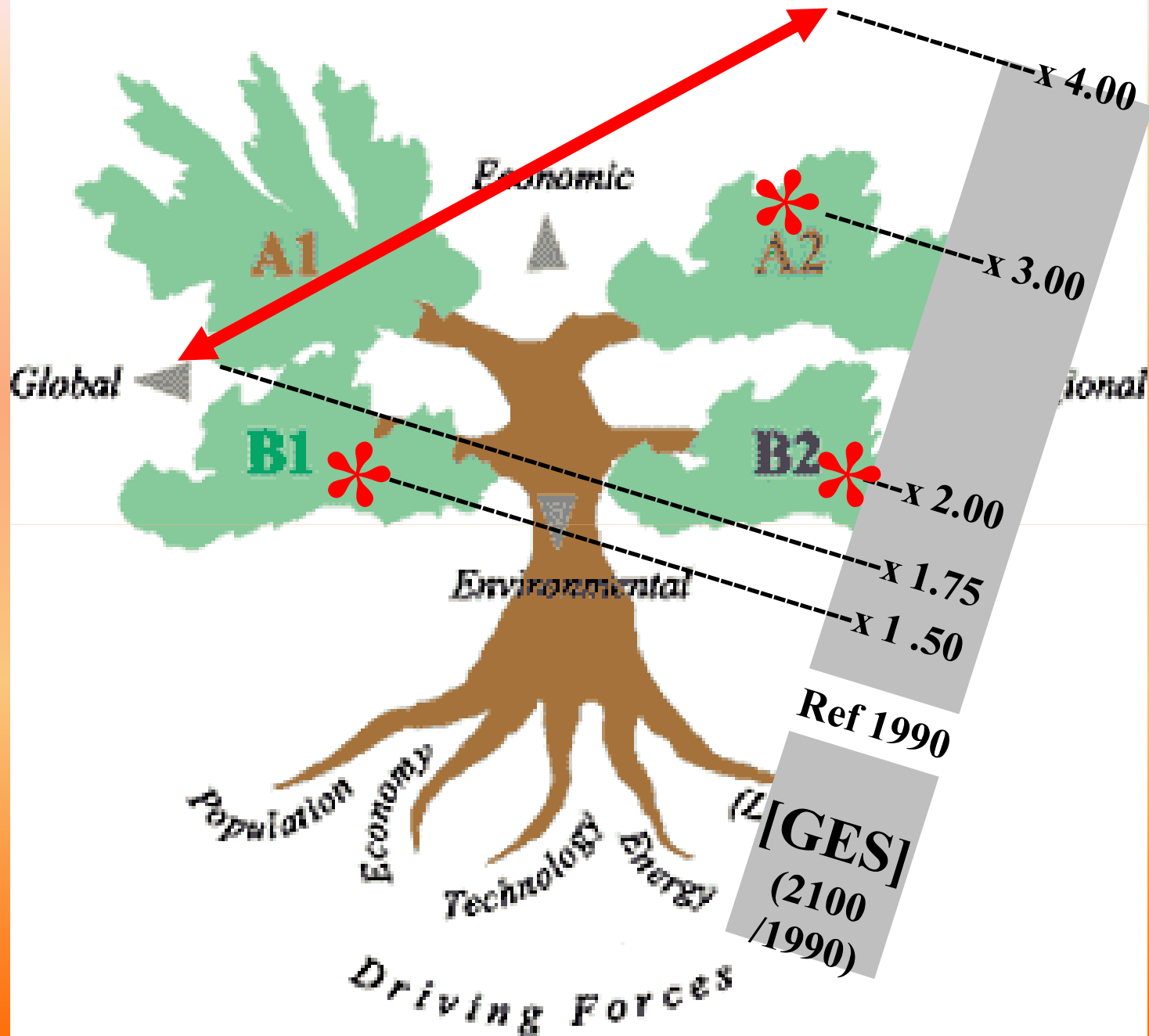
# Uncertainties and climate change (3/11)

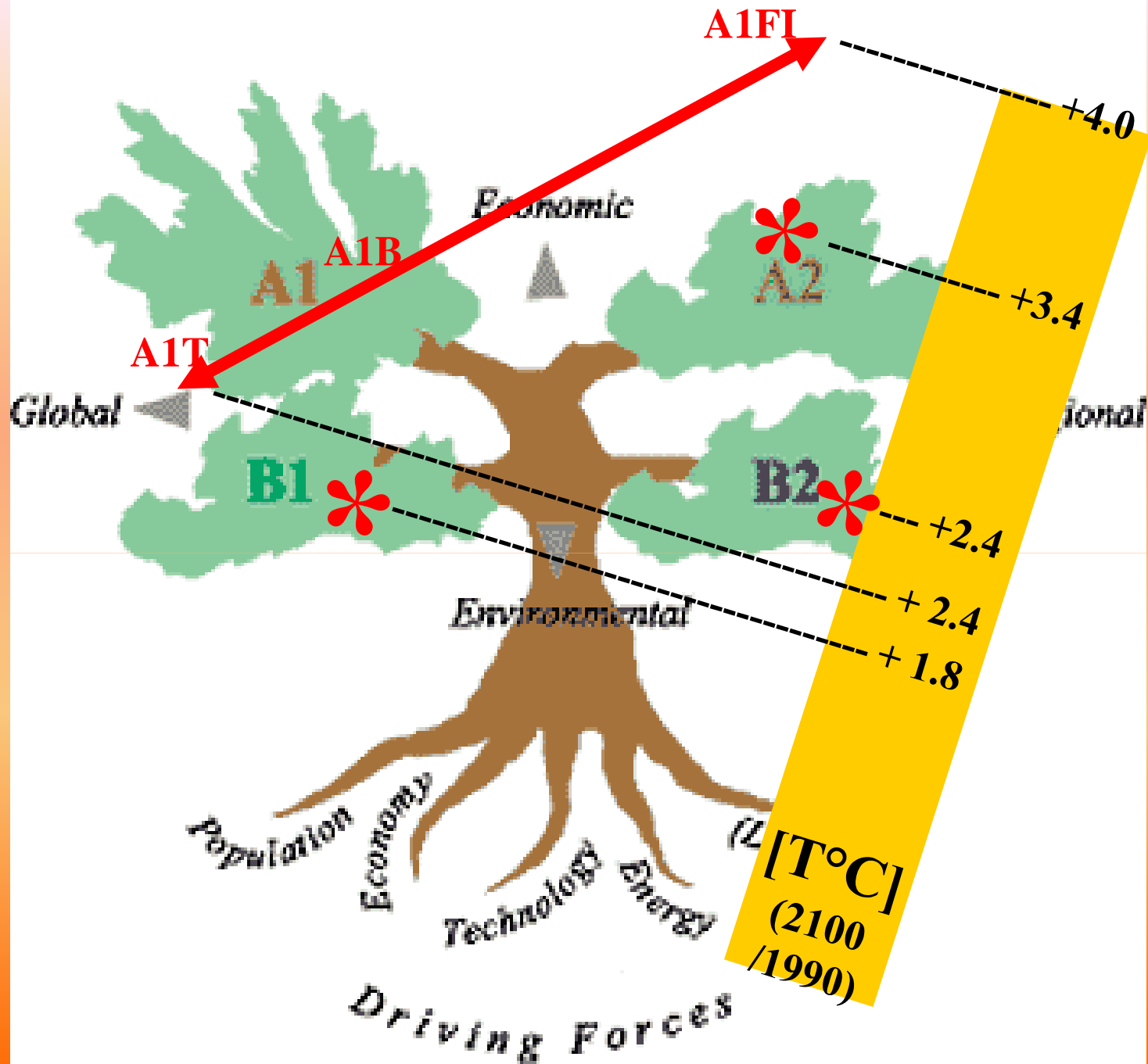


Future impacts depend on

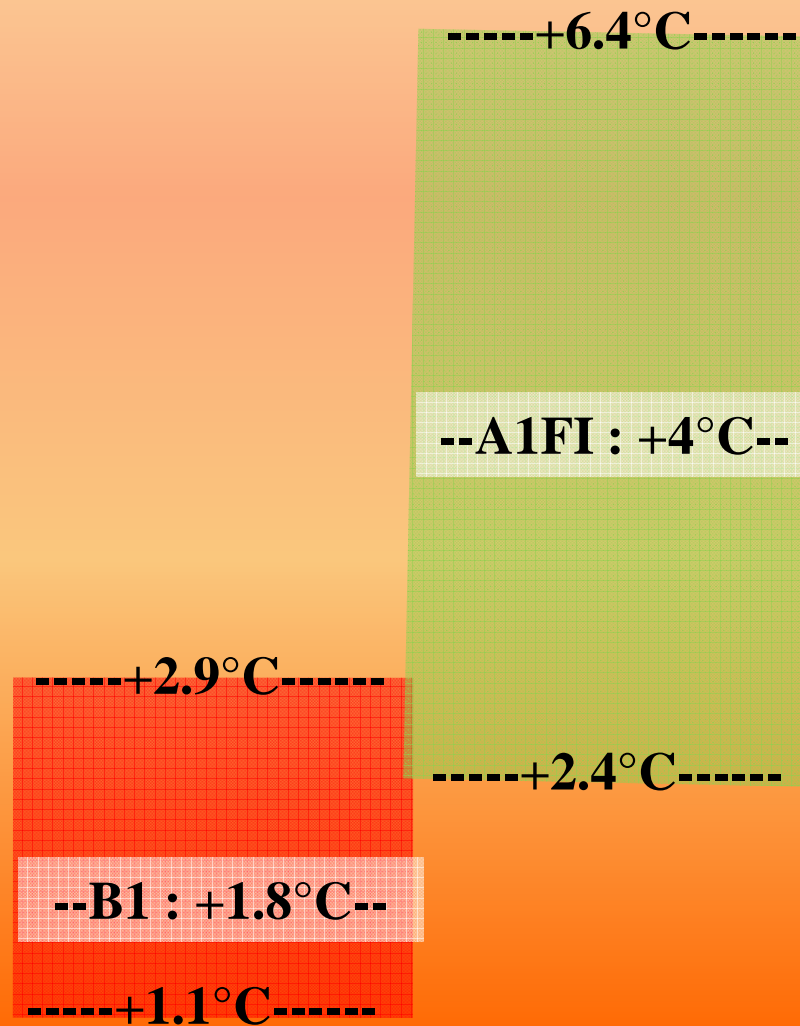
- # Socioeconomic drivers
- # Socioeconomic development
  - # IPCC special report on emissions scenarios (SRES)
  - # No mitigation is taken into account
- # Atmospheric greenhouse gases, albedo...
- # Climate models
  - # Atmosphere-ocean general circulation models
  - # Regional climate models
- # Vegetation models
  - # Present vegetation and its relationship with climate
  - # (Static) consequences under future climate
- # Models of ecosystem services...







Uncertainty due to the climate model:  
67% of cases are in the range (33% outside)  
Extreme scenarios are plausible  
Overlap between scenarios



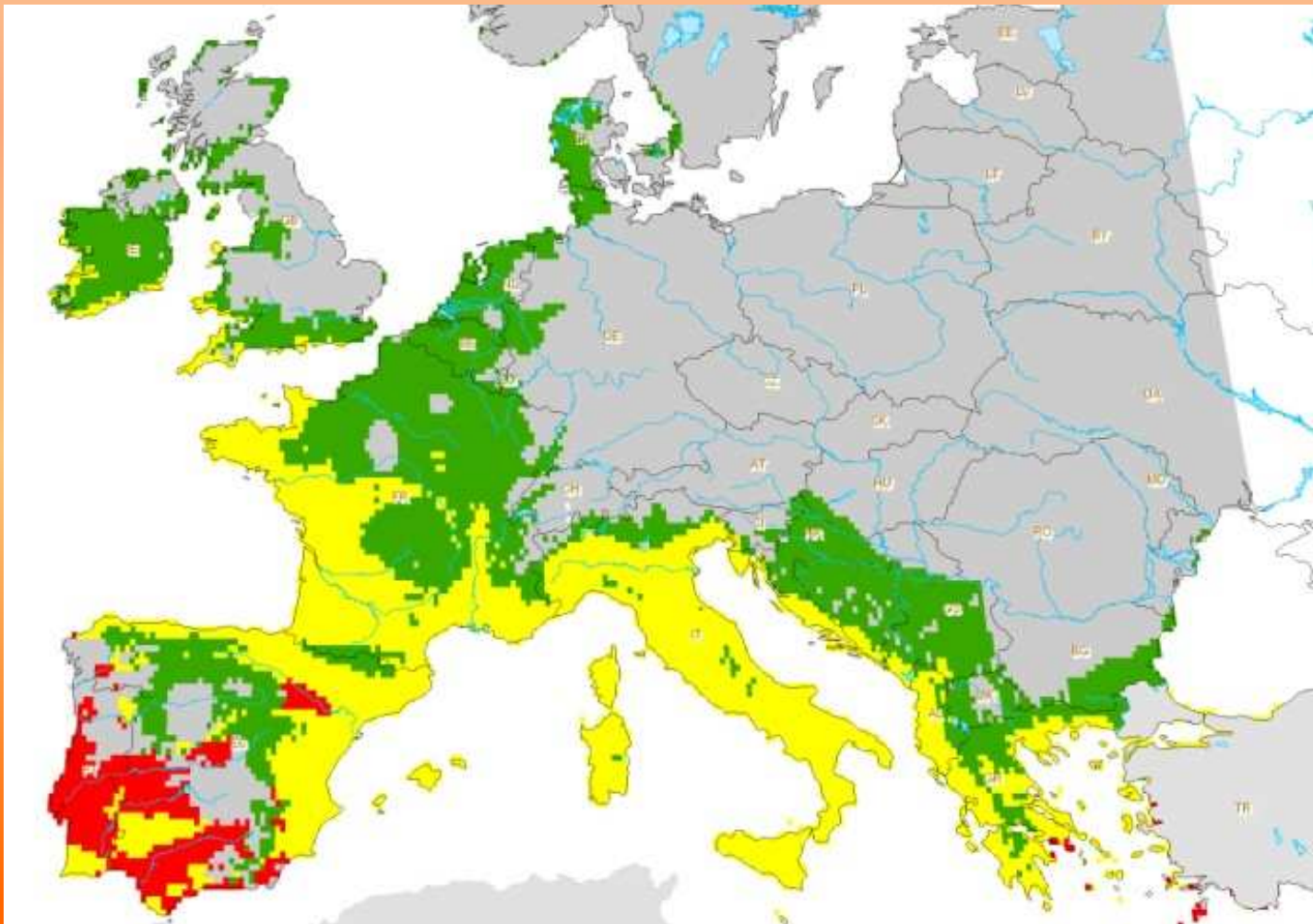
## Potential distribution area

Holm oak, HadCM3, A2, 2080/2000, Wilfried Thuiller...

Holm oak is and should remain in yellow areas

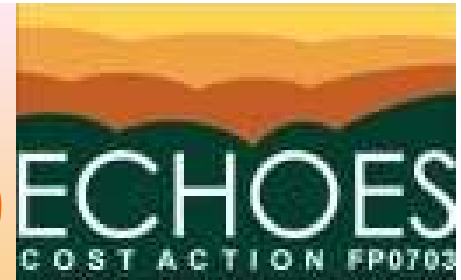
Holm oak is and could not be anymore in red areas

Holm oak might progress in green areas





# Uncertainties and climate change (9/11)

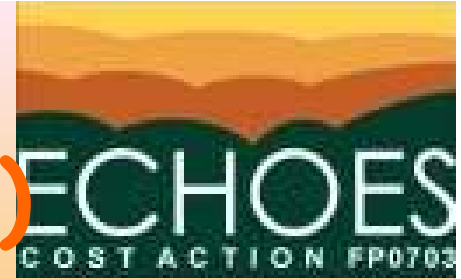


Future impacts are subject to

- + SRES scenarios (no most likely)
- + Hypotheses
- + Phenomena integrated or not
- + Model parameters
- + Discount rate (see Stern review, 2007)
- + Accuracy of data...
- + And finally
  - + uncertainties that could be reduced
  - + uncertainties that have to be recognized



# Uncertainties and climate change (10/11)



## Adaptation capacity

- # Of ecosystems
  - # Reactive autonomous adaptation (resistance, resilience)
  - # Teachings of genetics, ecology
  - # Trends and extreme events
- # Of sociosystems
  - # Individuals
    - # No adaptation for some of them (passive)
    - # Change according to what is observed (reactive)
    - # Change according to what you expect (proactive)
    - # Change according to uncertainty (proactive cautious)
  - # Proactive planned adaptation of institutions



# Uncertainties and climate change (11/11)



## Mitigation capacity

- # Accounting data
- # Permanence of quantities sequestered
- # Description of substitution
  - # Like cycle analyses
  - # Discount rate
- # One example: when you substitute electricity with bioenergy, how many emissions do you avoid?
  - # Marginal/average ones?
  - # National/European ones?



# Uncertainties and forest strategies(1/4)

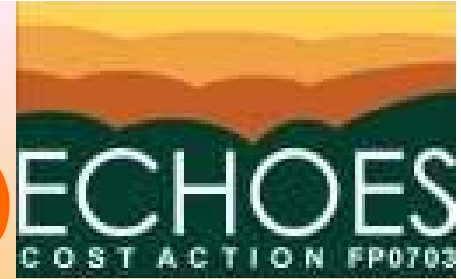


## Adaptive (collaborative)management

- # Continuous improvement process
  - # Monitoring
  - # Analysis
  - # Management policies
  - # Management practices
- # Strengthen the link between researchers and managers
  - # Mix scientific and local knowledge
  - # Develop capacity building, information and communication
  - # Professional training is very important
- # Provide flexibility



# Uncertainties and forest strategies(2/4)

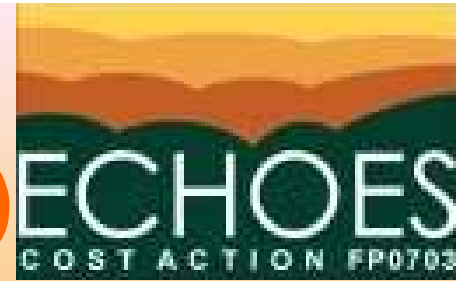


## Decisions

- # No regret strategies
- # Relax unnecessary constraints (ex. of provenance region)
- # Less optimization, more safety margin
- # Priority to decisions with positive effects on other sectors
- # Priority to local decisions
  - # More locally appropriate
  - # More diverse
- # Priority to reversible decisions
  - # Shorten the production cycles
  - # Increase the diversity



# Uncertainties and forest strategies(3/4)

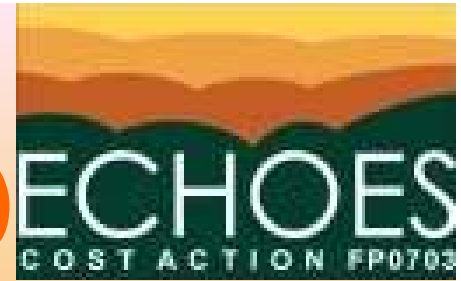


## Two main strategies

- # Shorten production cycles
  - # Fast growing species
  - # Short rotation ages
  - # Genetic improvement
  - # Intensive management
- # Increase diversity
  - # Stands (species, genes, biodiversity)
  - # Holdings (species, structures, short cycles and diversity)
  - # Landscape (coordination of actors)



# Uncertainties and forest strategies(4/4)



## Evaluation

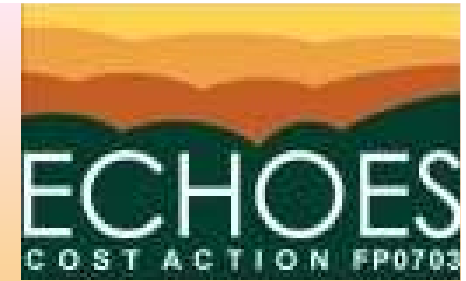
- # Analyze all possible futures
  - # "compulsory" foresight studies
  - # Use several scenarios (SRES)
  - # Consider various options
  - # Take into account local knowledge
- # Multicriteria analysis, with costs and benefits
- # Trade offs between
  - # Impacts, adaptation and mitigation
  - # Several adaptive strategies (alert vs.heavy investments)
- # Insurance ?



# Conclusions



- # Climate change mitigation alleviate the problem but will not be enough against climate change: adaptation is necessary
- # Adaptation to climate change will not be enough and must be considered in addition to mitigation
- # In the same way, research studies make knowledge progress but cannot avoid uncertainty
- # There is no best solution
  - # The future will tell
  - # Local solutions are superior
  - # Diversify solutions
  - # Evaluate solutions
  - # Develop collaboration between researchers and managers



Thank you for your attention

<http://www/gip-ecofor.org/echoes/>

calls for short term scientific missions:

May 15<sup>th</sup>,

September 15<sup>th</sup>,

January 15<sup>th</sup>