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SUPPORT SYSTEMS FOR DECISION AND NEGOTIATION PROCESSES

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FOREST PROPERTY : DECISION BETWEEN OBJECTIVES AND META-OBJECTIVES.

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Abstract : This paper deals with a forest property management model for the Landes de Gascogne massif. The results of the model, obtained by simulations give an idea of the different cultural practices to be initiated when we want to achieve classical economic objectives. However, when the ecological dimension is introduced, the classical economic objectives are replaced by patrimonial ones, that have to be translated into quantifiable criteria so as to integrate them in the model.

Introduction.

The forest of the Landes de Gascogne, with its surface of 1,166,300 ha, is the largest coniferous massif of the Europeen Economic Communauty. It plays a prominent economic role, specially in South-West of France.

For long, we have considered the only economic function of the forest and as a result, there has been either a devastation by forest owners who speculated on more advantageous cultivation, or a lack of management by owners who abandon this less profitable property.

More recently, great attention has been paid to the ecological function of the forest and to the necessity of defining a protection and sustainable development policy. To achieve this, the participation of forest owners is essential. This implies a thorough cognition of this field by public institutions.

I The Forest Property System in The Landes de Gascogne Massif.

For a thorough cognition of this field, we have built a model of forest property based on system analysis. The method used can be applied to complex systems and is easily communicable and accessible to non-computer-scientists. It is J.W. FORRESTER 's System dynamics (1969).

I-1 The model of the forest property.

This model deals with two aspects : a technical one corresponding to Tables of Production, and the second concerning economical dimension.

The technical part shows the evolution of a maritime pines planting having a area of 1 ha. At time 0, 5,000 plants are planted. Biological and ecological constraintsare analysed in this model. Here, it refers to the study of trees growth in the planting related to sylvan and ecological factors. The technical aspects compute, year after year, the average height of the planting, the circumference of the trees, their unit volume, etc..

Forest management activities such as planting, cleaning, thinning and final felling are decided by the owner. In the course of a single cycle, several thinning operations are necessary in order to favour the development of thick and healthy trees, influencing thereby their characteristics such as height, circumference... The decision variables are the date and the size of each thinning.

The economical aspects concerns financial flows proceeding from forestry work realized in the area, the products of timber sales (thinning and final felling) as well as administration expenditures (taxes...).

I-2 The results of the simulations

The different simulations show two modes of cultivation corresponding to the achievement of classical economic objectives : owner's profit maximisation or maximisation of the rate of return on initial investment.

Results:

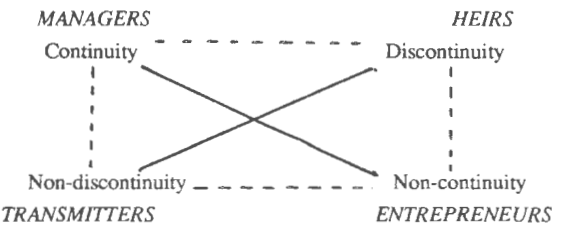
Age	Profit maximisation	Rate of return maximisation
3 years	Thinning : 2500 trees	Thinning : 2500 trees
6 years	thinning : 1300 trees	thinning : 1300 trees
16 years	thinning : 400 trees	thinning : 400 trees
24 years	thinning : 200 trees	thinning : 200 trees
30 years	thinning : 150 trees	thinning : 100 trees
38 years	thinning : 100 trees	final felling at 39 years
46 years	thinning : 70 trees	**rate of return : 4%**
	final felling at 50 years	**final cash : 45 000F**
	rate of return : 3,8%	
	final cash : 75 000 F	

A survey showed that classical economic objectives are not the aim of management modes by forest owners.

II Strategies.

II-1 A typology of forest owners.

The survey was enable to define four profiles of forest owners based on the continuity of decision making criteria. These hypothesis can be represented on the following figure :



The continuity in management and decision making characterises the "manager" type. For these owners, the forest is a long time investment; They are very few in this massif because the maritime pine is not an attractive investment for speculation.

The non-continuity pertains to entrepreneurial profile. This type concerns the large properties where the tendancy is to innovate and better their forest cultivation in order to increase the value.

The discontinuity in management is the case of forest owners who are "heirs". In fact, they have inheritzed a patrimony from their parents. They consider the forest as a source of revenue and operate thinnings or final fellings in case of important expenses. They just do the necessary and compulsory work to keep the forest alive.

The non-discontinuity corresponds to transmitters of a patrimony. As they have inherited, their desire is to transmit in their term.

II-2 The necessity to transmit the forest patrimony.

The two first categories define the "modern" foresters who are aware of the productivist model based on the economic reasoning, where the production of timber is the prime concern. In this case the forest is considered as a raw material, not taking in consideration its renewing.

The utilization of the productivist model in forestry has ecological and economical consequences that mus be taken in consideration to manage natural resources with more great care than up to now.

In fact, the intensification of forest culture, nowadays, focalises essentially on the use of fertilizers and genetic betterment leading to a rapid growth of trees and straightness stems.

The main ecogical consequences concerne in particulary the ground water (pollution, need of more water...) the long term ground fertility and the risks tied to a specialized monoculture.

The economic consequences concerne the increase in costs relative to the decrease of planting turnover (more frequent use of ground preparation technics), to the necessity of a better protection against abiotic factors (fire, etc.) and biotic factors. Tax impact should also be estimated in this forestry new model (thirty years tax exemption, transference rights...).

In the last two categories, we find "traditionnal" foresters who consider their forest as a patrimony. Nonetheless, the choice between a "heir" and a "transmitter" beheaviour is the fact of the individual choice, that is a micro-economic choice.

However, the recent awareness of the ecological function of the forest and its necessity to define a protection and sustainable development policy gives to the choice its macro-economic dimension. It is a societal objective, a meta-objective.

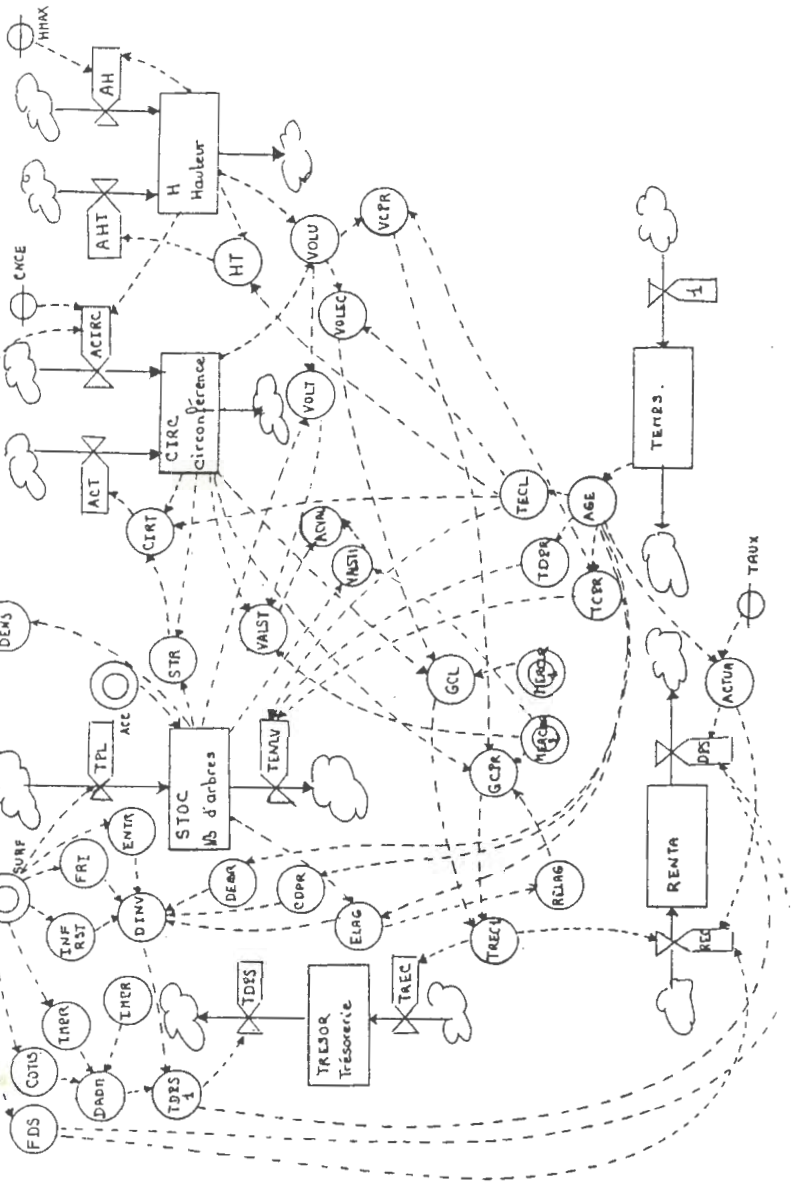
Our problem is now to express this macro-economic objective in its micro-economic form, to correspond to the individual level and to translate it in quantifiable criteria so as to integrate it into the model.

Conclusion.

This model offers the possibility of comparing numerous policies. It brings solutions to various foresters' problems.

However, the "system-actor" approach unveils the ecological and patrimonial functions of the forest, both on the individual an social levels. We have now to conceive an appropriate model for forest management including, at the same time, productivity, rurality and conservation of patrimony objectives. We have to conciliate individual and collective objectives.

Diagram of the forest property in the Land de Gascogne massif.



List of variables in the diagram of the forest property model.

VARIABLES	SIGNIFICATION DE CES VARIABLES
	I - Modèle technique
STOC	nombre d'arbres
TECL	taux de plantation (5 000 tiges par hectare en général)
TENLV	taux d'enlèvement
AH	taux d'accroissement en hauteur
H	hauteur
AHT	taux d'accroissement technique en hauteur (après éclaircie)
HMAX	fertilité du terrain
CIRC	circonférence à 1 m 30
ACIRC	taux d'accroissement en circonférence
ACT	taux d'accroissement technique en circonférence (après éclaircie)
STR	surface terrière
TDPR	taux de dépressage
TECL	taux d'éclaircie
TCPR	taux de coupe rase
AGE	âge du peuplement
VOLU	volume unitaire
VOLT	volume total du peuplement
VOLEC	volume éclairci
VCPR	volume extrait lors de la coupe rase
CNCE	coefficient de concurrence
SURF	surface de la parcelle
DENS	densité du peuplement
HT	variable auxiliaire intervenant dans le calcul de l'accroissement technique en hauteur
CIRT	variable auxiliaire intervenant dans le calcul de l'accroissement technique en circonférence
	II - Modèle économique
TRESOR	trésorerie
TDPS	taux de dépenses
TREC	taux de recettes
TDPS 1	variable auxiliaire intervenant dans la calcul des dépenses
DADM	dépenses administratives
COTIS	différentes cotisations (syndicat, DFCI, assurance)
IMPF	impôt foncier
IMPR	impôt sur le revenu
DINV	dépenses d'investissement
INFRST	frais d'infrastructure
FRI	frais d'installation du peuplement
ENTR	frais d'entretien du peuplement
DEBR	frais de débroussaillement
CDPR	coût des dépressages
TREC 1	variable auxiliaire intervenant dans le calcul des recettes
GCL	recette de la vente des produits d'éclaircie

GCL	recette de la vente des produits d'éclaircie
MERCUR 1	mercuriale n° 1 concernant les éclaircies
GCPR	recette de la vente de la coupe rase
MERCUR 2	mercuriale 2 concernant le prix de vente des produits de la coupe rase
FDS	fonds
RENTA	réservoir permettant le calcul du taux de placement
TAUX	taux de placement t
ACTUA	variable auxiliaire permettant l'actualisation des dépenses et des recettes
DPS	dépenses actualisées au taux t
REC	recettes actualisées au taux t
VALST	valeur commerciale du peuplement au cours de l'année considérée
VALST 1	valeur commerciale du peuplement au cours de l'année précédente
ACVAL	accroissement du peuplement en valeur
ACC	accident survenant (incendie, chablis)
ELAG	coût de l'élagage
RELAG	recettes supplémentaires dues à l'élagage

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