

Close-to-nature Silviculture: Is this concept compatible with favouring species diversity in forests?

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ABSTRACT

Schütz, J.-Ph. (Swiss Federal Institute of Technology (ETH-Z) Zürich, Chair of Silviculture, CH 8092 Zürich, Switzerland) *Close-to-nature Silviculture: Is this concept compatible with favouring species diversity in forests?*

The concept of close to nature silviculture is an old one. It has been developed by K. Gayer at the end of the last century, and has been applied for more than hundred years for instance in Switzerland and Slovenia, mostly with success.

There are different ways to characterise such a silvicultural system, depending on the emphasis which is given either to the term "culture" as to the term "nature". In the past there have been different interpretations, a liberal one according to Leibundgut who accepts the use of all forms of regeneration we find in primeval forests, including regeneration on large areas. On the contrary, there is a more strict interpretation according to Möller based on successional processes.

Nowadays the concept needs to be improved incorporating the importance of favouring forest biotope diversity and the potential of natural automation for economic reasons. It is necessary to embody a great diversity of silvicultural techniques according to Leibundgut's principle of "free use of cuttings".

Key words: close to nature silviculture, biodiversity, structuration, naturautomation, new silviculture

THE IMPORTANCE OF NEW NEEDS FOR SILVICULTURE

Since the Rio Earth Summit in 1992, many basic concerns have been changing our essential approach towards nature. In order to make this deep change in perception of environmental problems understandable, the notion of new paradigm is becoming more and more advanced. Forests represent a large part of the living conditions on the earth as well as more or less representing naturally retained ecosystems (at least in their functioning). The pressure on forestry to counteract destruction of nature is therefore very high. More and more we become aware of the fact that nature cannot be exploited beyond a certain limit. Furthermore, these problems have to be considered on a large scale going beyond past state boundaries.

However, this is not a new problem. The limits of development have been being postulated since the sixties. I would like to recall the commitment of the Club of Rome to drawing attention to environmental issues in the well-known book of Meadows et al. (1972) "The limits to growth".

The same applies to the concept of close-to-nature silviculture. This silvicultural concept was developed at the end of the last century, in a time of emergence for new paradigms together with the movement of the Physiocrats and their motto "Return to nature". The concept of close-to-nature silviculture was first formulated by Karl Gayer, professor of silviculture at the forest faculty of Munich in 1880 and especially in 1886 through his determinant book "The mixed forest".

EXPERIENCE GATHERED DURING MORE THAN A CENTURY OF APPLICATION OF CLOSE-TO-NATURE SILVICULTURE IN SWITZERLAND

We have been applying Gayer's silvicultural philosophy in Switzerland continuously for more than a century. With its application many questions of improvement at the level of silvicultural practicability arose. Much knowledge grows from practical experience. In retrospect, some ideas proved to be right, others were wrong or have at least been more difficult to realize.

Interesting for silviculturists - in the sense of the actual enthusiasm for these ideas of naturalness - is not mainly to emphasise successful realisation, but to look critically at the more difficult points, because much can be learned from previous mistakes and thus, failures that have almost been forgotten can be eradicated or at least not repeated. It is, therefore, necessary to be sufficiently critical and to dig out failures from previous experience. This is not very easy as the brain tends to forget failures and to retain only success. In silviculture, as well, due to the slow development of forests, failures disappeared from our memory-package, from written as well as other sources.

If we have a close look at the experiences drawn from this past century of application, we realize that insufficient progress has been made towards the following original goals:

1. Establishment of mixed stands
2. Promotion of stand irregularity

THE TENDENCIES OF NATURAL SUCCESSION TO PROMOTE MONOSPECIFICITY

Where the first point is concerned, P. Burschel (1987) has made a severe appraisal of failures after the period of one century for the region of Bavaria, where Gayer worked and irradiated. The main reason for this is that the mixtures of tree species complicate stand evolution, and mixed stands need more silvicultural interventions to ensure the maintenance of less competitive tree species. If these necessary interventions are not realized, nature develops a domination by only a very few competitive species and forms rather unmixed forests. The study of natural forests shows that a very small number of tree species dominates others and leads to a diminishment of the mixture and to a creation of mostly uniform stand-structures.

These two characteristics of structure homogenization and demixture happens more on good site-conditions than on harsh ones. This fact becomes evident if we observe natural forests. In fact, virgin forests are mostly constituted monospecifically as far as tree species composition is concerned dominated by only one species like beech or oak, overwhelming in its succession. Associated species are generally suppressed because of their lack of competitiveness. This is the reason why natural forests in central temperate Europe are largely dominated by pure beech or oak stands. It is necessary to note that this model works for European conditions, however not for the conditions of North America. Only if site and climatic conditions decrease, do we find naturally mixed forests. With a diminishing precipitation, for instance, oak successively replaces beech. Beech-fir (spruce) mixed forests appear with diminishing temperature, i.e. in the montane elevation belt.

TENDENCIES OF NATURAL SUCCESSION FOR THE PROMOTION OF STRUCTURE REGULARITY

The same principle can be observed with regard to stand irregularity. Virgin forests generally show regular structures, at least during an essential part of their development. From the phase of aggradation to the end of the optimal phase, homogenization i.e. creation of regular stands can be observed as dominating principle. Only in the regenerative phase, in relation with stand disruption with senescence, can a predisposition for mixture be found.

In this case too, evolution depends on site and growth conditions. One of the best examples for this dependency of a stand structure on site conditions is the difference of structure of

natural spruce forests at various elevations (Korpel, 1982, 1995). This forest formation occurs naturally, in the Alps at montane and subalpine elevation i.e. at an elevation of 1100 m above sea level in conditions not far too continental climate conditions. Natural spruce forests in the Alps are generally very dense, fully closed and regular in structure during an important part of their ontogenetic cycle. The reason for this lies in the extraordinary adaptivity of this tree species regarding light conditions (tolerating both full light as well as shade) and its very good space utilisation (See fig. 1). This tendency to create regular closed structures is valid only below certain limits of elevation.

Only at subalpine elevations i.e. above 1400-500 m elevation, do spruce forests show irregular structures. The reason for this lies in frequently occurring snow damage and subsequent interruption of stand closure on a small scale (See fig 2).

THE DIFFICULTIES OF CREATING LONG-TERM IRREGULARITY IN FORESTS

A second goal which, in retrospect, has not been reached in Switzerland in spite of strong desire and attempts by foresters during half a century was to create irregular stands everywhere. This finding is true as a general rule especially for medium elevated forests, mainly on natural beech sites i.e. for broad-leaved forest conditions.

This assertion may astonish because Switzerland is a country well known for its application of an uneven forest system, the so-called selection system also called plentering. This silvicultural concept was formalised and elevated as a full and very original silvicultural system by the Swiss forester Henry Biolley, a contemporary of Gayer at the end of the nineteenth century. Biolley's main publication on the plenter system dates back to 1901. The system has been applied firmly and consistently ever since in regions with a tradition of this special type of forest tending, very successfully for instance in the Canton of Neuchâtel and in the valley of Emmental (Canton of Bern).

As a matter of fact, the plenter system could turn out to be one of the best tending systems for the future regarding the actual complexity of needs and the economic difficulties of harvesting timber. This system realises a well-balanced result, based on biological rationalisation or so-called natural automation.

To be realistic, it has to be said that according to the national inventory survey only 8 % of our forests are really irregular, in the sense of functional irregularity i.e. with sustainable irregularity or the kind of continuous structure which remains constant in the long term. This fact has to be analysed with critical objectivity, although the survey's result is disappointing considering that Swiss foresters have tried to apply the plenter system on an important part of our forests reaching far over the 8 % of this factual representation. In fact, during almost 50 years until about World War II, Swiss foresters had tried to realise the selection system practically everywhere, i.e. even in forests of broad-leaved trees and also for light-demanding species. For the last two forest types, attempts to realise permanent irregularity completely failed. The reason for this is that in sites where single-tree selection and natural regeneration are difficult and where natural stand evolution tends toward regularity, it is necessary to engage in very intensive and often repetitive silvicultural interventions to realise the same goals.

One of the consequences of the application of single-tree selection on large-scale areas during many decades in Switzerland and thus the giving-up of superficial regeneration was that only shade-demanding tree species have been favoured, especially silver fir (*Abies alba*) which was only conform to site conditions in few areas. This exaggerated promotion of fir next to the shade-tolerant beech had very negative consequences, as fir showed a predisposition for dying back after a succession of dry years. It is important to remember that the problem of forest decline began in the fifties with the decline of silver fir.

A second observation we made in Switzerland in the fifties was the lack of young stands and of recruitment in pole dimensions. These observations led Swiss foresters and above all those responsible for silvicultural education to appreciate that in a general silvicultural concept which claims to be naturally-oriented a system is needed, which leaves space for single-tree

regeneration as well as for superficial or collective regeneration according to the regenerative particularities and needs of the different tree species. We are not speaking of a return to the clear-cut philosophy, but of a system which combines collective regeneration in more or less extended gaps to ensure the growth of light-demanding species and thus to promote optimal mixtures.

This was the reason why Schädelin (1928) and after him Leibundgut (1946) incorporated both the plenter system as well as the irregular shelterwood system (so-called Femel system) in to the instrumental package of close-to-nature silviculture. The main characteristics of such a silviculture of natural inspiration is to use all the regeneration modes we find in natural forests according to the different renewal positions depending on the type of shading given by the old generation to ensure natural renewal. This definition of the term „nature“ in the close-to-nature concept is based on the fact that in natural forests we generally find all the renewal positions. However it is necessary to highlight that the general renewal pattern in virgin forests is mostly a regeneration under sheltered position in more long-lasting and overlapping periods between mother and sister generations (Korpel, 1995). Individual or single-tree regeneration after the pattern of the plenter system is very unusual, even practically non-existent, for instance in natural beech forests (Reh, 1993).

The plenter system is, therefore, a typical man-made system, which can only functionally exist as long as periodical interventions correct the stand-closing tendencies. However, it has a high degree of self-regulation and self-regeneration once it has been established. The great difficulty lies in establishing the starting prerequisites: sufficient irregularity. In this sense of a natural quasi self-functioning system, the plenter-system is one of the best instruments of a close-to-nature silviculture, but it is not very easy to realize in practice.

CHARACTERISTICS AND ADVANTAGES OF THE LIBERAL DEFINITION OF SWISS CLOSE-TO-NATURE SILVICULTURE

Swiss forestry has developed a relatively liberal and pragmatic way of considering naturalness in silviculture, more emphasising the meaning of „culture“ than „nature“. It is based on a joint utilisation of the different silvicultural techniques. It is not a silvicultural system which is decisive but rather objectives to be reached in terms of tree-species composition, stand-structures and filling-up the different needs. The different cutting forms and regeneration types belong to the palette of silvicultural instruments. To characterise such a polyvalent way of conceiving silviculture, Leibundgut developed the principle of **free choice of cuttings**. This principle appears to be remarkably modern considering the new issues for biodiversity and aestheticism in forestry.

The concept of close-to-nature silviculture is open to varying ways of interpretation which mainly depend on the emphasis given to the terms of „culture“ and „nature“ and the value we associate with these two key expressions.

Depending on sensibilities but also on interests represented, today there are tendencies to a very different interpretation of close-to-nature perceptions. Apart from the liberal interpretation developed in Switzerland, there are other very strict ones, based on emphasising only limited silvigenetic processes for instance.

The position of organisations involved in nature conservation supports a conception more based on the term „nature“ than „culture“. From their point of view such a policy seems logical in the sense of defending this area of interest. Positions of such extremity cannot be accepted as they ignore the interests and needs of others. They tend to make believe that only untouched nature and only preserved forests where forestry is concerned meet the needs of living species conservation and, therefore, have to be realised for the maintenance of biodiversity. Such an argumentation is only valid if we compare extreme systems, for instance artificial forestry with a virgin one. Numerous scientific results show that today a multiply-used forest is not incompatible with nature conservation goals going together with a high level of timber revenue,

provided that certain rules of management are respected. Serious specialists, on the contrary predict that forest managed in a modern way with emphasis on multifunctionality and the promotion of diversity (i.e. more dead timber) has a more positive effect on biodiversity than untouched forest (Ammer et al. 1995).

THE EUROPEAN NEW FORESTRY: CONSIDERING JOINTLY ALL THE NEEDS

The necessity of favouring biodiversity today has to be incorporated into our silvicultural concepts. Forests are some of the well-developed superstructures and therefore characterise and encompass important habitats for fauna and flora. Our contribution to favouring biodiversity lies mainly in realising an important **diversity of biotops** by creating different structures and using different regeneration forms. Biodiversity in forest needs monospecific biotops as well as mixed forests, single-tree regeneration as well as superficial renewal, dark forests as well as light ones. The principle of such a silviculture can be called „**the principle of diversity by diversification**“ (Schütz, 1997).

The challenge for forestry and silviculture today lies in the fact that their needs have considerably changed and still continue to change radically. The reason is that not only new areas of need emerge, but also new interest groups. General interests for social amenities or needs are becoming more important than particular interests. Tomorrow there may be global interests for the preservation of life conditions on the earth. This phenomenon leads to conflicts of interests. In this sense, we fully agree with Ciancio and Nocentini (1996) that silviculture increasingly has to **manage a complexity of issues**, and as this complexity is made by mankind, close-to-nature systems have to incorporate the most disruptive participant: mankind. It seems evident that for attaining goals of nature conservation, firstly, it is necessary to convince mankind to conform to the needs of nature. The main problem of close-to-nature silviculture is a question of harmonious cohabitation and not a problem of segregating functions or putting nature under a glass cover.

As a first step, these conflicts of interests lead to confrontation and even to polarisation and controversy. Conflicts cannot be solved by ignoring the different interests in question nor by struggling in an ideological fight. This only leads to unproductive theosophical dispute. We need an ideologically free way of solution-finding by bringing together the different points of view and looking for appropriate joint solutions (Scherzinger, 1996). Therefore, it is necessary to emphasise good solutions more than to fight against weak ones. A close-to-nature concept which is only derived from a sickness of clear cutting is not a good one.

To foresters practising a single-tree selection based on the conviction that only a plenter system can be the correct tending, our advice based on the experiences made in Switzerland is: pay attention to the risks of forgetting the recruitment necessities and sustainable regeneration. It is good to fight against an excess of a clear cutting silviculture. However, it is important to develop an instrument for controlling the demographic sustainability by controlling the requirements of a qualitative recruitment. For light-demanding species, a single-tree selection does not seem to be the appropriate way to ensure qualitative regeneration.

THE CHALLENGE OF ACTUAL SILVICULTURE: RECONCILING ECONOMY AND ECOLOGY

The challenge of today is to reconcile old needs (for instance timber production) with new ones such as social needs and the new emerging ones to ensure maintenance of the forests as heritage.

Where nature is concerned, it is necessary to achieve a good cohabitation between naturalness on the one side and the artificialness of today's world on the other. Our artificial way of living creates precisely new needs and desires of more nature as a compensation. It is

also necessary to take into account the different conflicts in order to define the way of resolution. As needs are changing continuously, the **principle of adaptation**, i.e. to consider the possibly changes of forest's original functions and to ensure adaptability of forests we establish has to attain a high priority in our concepts (Schütz, 1997).

One of the biggest barriers to finding a solution today is the increasing discrepancy between economic and ecological interests. We are confronted with both an economic crisis in timber production and the ecological crisis. It is necessary to reconcile these two poles and to find silvicultural systems which respect not only naturalness but also cost and productivity because it is on these the economic issue that the chances to succeed really depend. In this sense, we have to promote systems based on **biological rationalisation** more than those based on mechanical ones. Hereby we mean 'selfing' systems, for instance, in forestry using self-regulation and self-regeneration, which today is called **natural automation**. This way of reconciling economy and ecology can be called the nature opportunistic way in silviculture (Schütz, 1997). It is not only conceived in a manner of economic efficiency but still has ecological significance: only more or less self-functioning systems have a chance of thriving in the long term.

The best way to illustrate the conditions for finding new systems is to analyse the whole in a three dimensional thinking system, where the three dimensions are not necessary converging (See fig. 3). Absolute naturalness is neither converging with structuring nor with hemeroby or the axis considering the necessity of controlling development by silvicultural interventions, this in relation to the costs. A realistic and opportunistic polyvalent silviculture tries to attain optimal ways for realising the best combination on these three axes.

CONCLUSIONS

However, solutions do exist! The silvicultural concepts we have been developing up until now have been oriented to optimise only one need, that is mostly timber production. In the future, we have to rethink our concepts and include real multifunctionality on a large scale, not only in managing the different functions, but also on the level of forest stands. This is also valid for educative operations i.e. the thinning systems as well as for regeneration systems. As far as educative operations are concerned, we have to better dissociate different compounds within the stands in the future. In one and the same stand, different trees can fulfil different goals and thus be treated in a differentiated way.

This is an important challenge which encourages silviculturists to progress in a constructive and positive way.

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FIGURES LEGENDS

- Fig. 1. Example of regularity of stand structure of natural spruce forests in European high mountainous conditions at montane level (according to Korpel, 1995).
Forest of Kotlov žľab; western Tatras, Slovakia; elevation: montane
- Fig. 2. Example of irregularity of structure of subalpine spruce forests (according to Korpel, 1995)
Virgin forest area Nefcerka, Slovakia, Elevation 1500-1550 m; subalpine belt
- Fig. 3. The three dimensions defining the way chosen by a real multifunctional (polyvalent) silviculture

FIGURES

Primeiro Fundo Floresta Atlântica

Fundo Especial de Investimento Imobiliário
Florestal Fechado

Fórum Biodiversidade: Silvicultura Próxima da
Natureza

Estoril, 24 de Junho de 2008



- Sumário Executivo

- Enquadramento – Investimento em Activos Florestais

- Enquadramento – Investimento em Activos Florestais Nacionais

- O Primeiro Fundo Floresta Atlântica

- Exemplo de Valorização de Activos Ambientais – O mercado voluntário de carbono

- Requisitos de Produto

- Outros casos de Valorização de Activos Ambientais

O investimento em Activos Florestais em Portugal constitui uma oportunidade a capturar através da dimensão e da operacionalização das melhores práticas de gestão



INVESTIMENTO FLORESTAL É ATRACTIVO

- Rendibilidade superior às classes de activos tradicionais de risco semelhante se bem gerido e em escala adequada
- Ferramenta de diversificação de risco (correlação baixa ou negativa com restantes classes de activos)
- Preço da madeira é cíclico (vs. aleatoriedade do mercado capitais) e cresce em linha com inflação

PRESSÃO AMBIENTAL IMPÕE INVESTIMENTO FLORESTAL

- Protocolo de Kyoto e recentes acordos de Bali impõem o desenvolvimento sustentado
- **Floresta como *green-investment* (utilizável para *brand-awareness*)**
- Sensibilização crescente de Particulares e Empresas para as alterações climáticas impõe o desenvolvimento do mercado voluntário de CO2 e de Biodiversidade

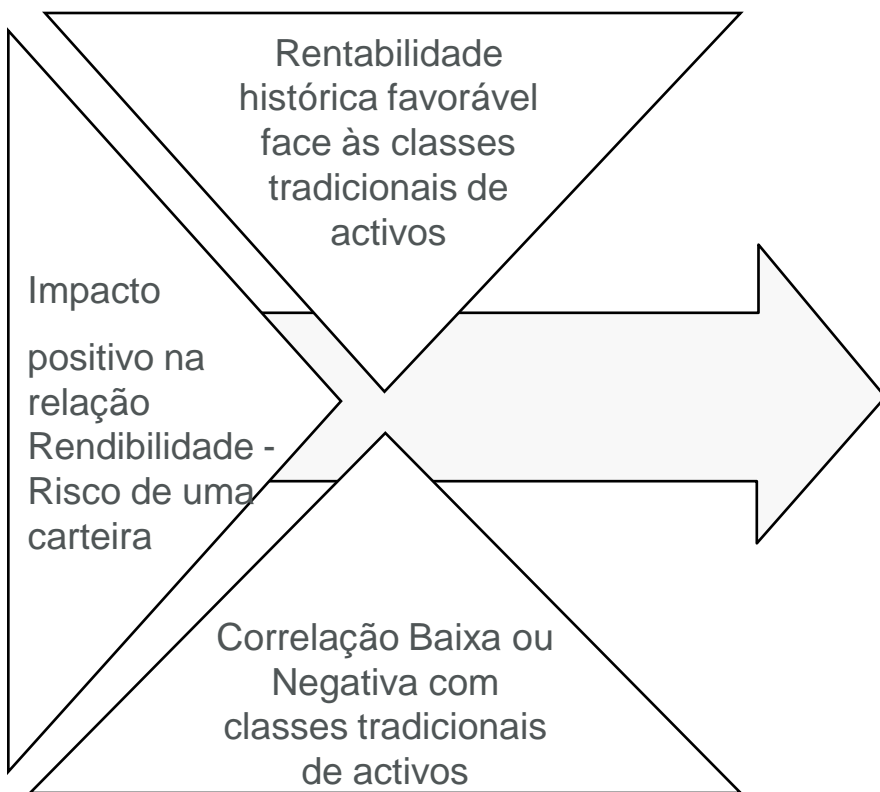
INVESTIMENTO FLORESTAL APOIA-SE NUMA TENDÊNCIA SUSTENTÁVEL DA PROCURA

- A madeira é um bem crescentemente escasso (e.g. protecção florestas tropicais, florestas sustentáveis, certificação e acordos de Bali)
- A madeira tem uma procura crescente e de natureza estrutural (mercados tradicionais + Ásia e outros emergentes)
- **Perspectiva de valorização de externalidades positivas da floresta (e.g. CO2, Biodiversidade, Gestão Água)**

PORTUGAL APRESENTA EXCELENTE OPORTUNIDADES PARA O INVESTIMENTO FLORESTAL

- Condições naturais favoráveis (taxas de crescimento lenhoso das mais altas da Europa)
- Condições favoráveis a espécies de elevado valor
- Elevada disponibilidade de solos e de proprietários florestais em mudança geracional
- Fontes de procura locais com dimensão (pasta papel, aglomerados, centrais eléctricas)

O Investimento em Activos Florestais constitui um excelente veículo para a diversificação e proporciona um horizonte de investimento alargado



Os “Activos Florestais” constituem uma Classe de Activos interessante para Investidores com um horizonte temporal de investimento longo e uma ferramenta para a diversificação da carteira

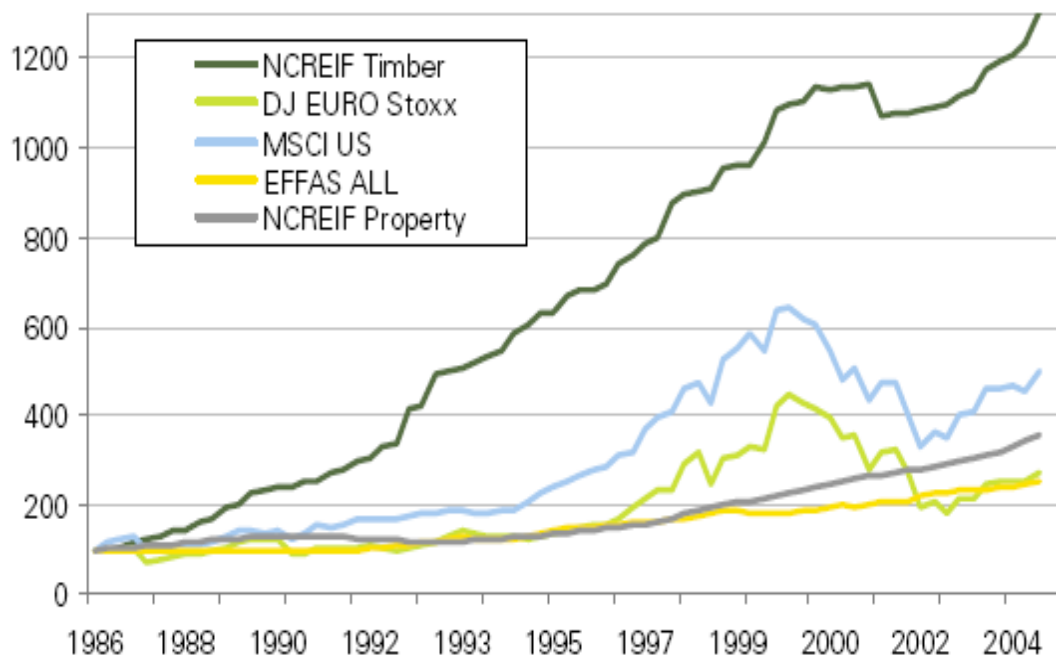
Historicamente os “Activos Florestais” apresentam uma Rendibilidade superior em relação aos Activos Tradicionais de Risco Semelhante



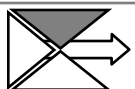
Rentabilidade histórica favorável face a Classes Tradicionais de Activos – Europa/EUA

Rentabilidades Anuais Acumuladas EUA/Europa

Indexada (100 = Dez 86)



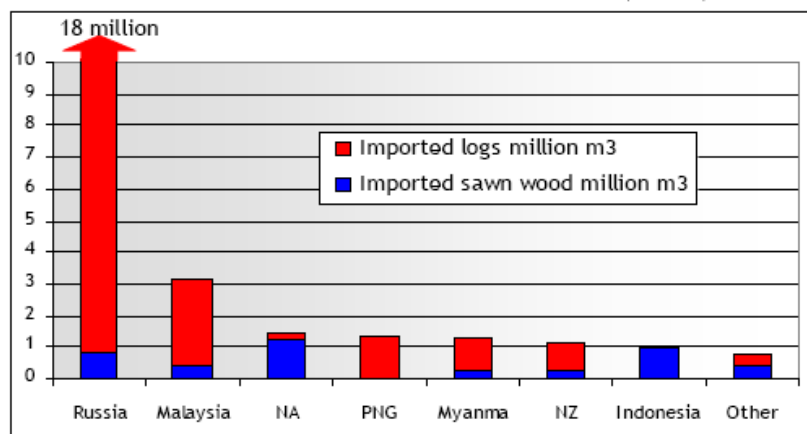
Historicamente os “Activos Florestais” apresentam uma Rentabilidade superior em relação aos Activos Tradicionais de Risco Semelhante



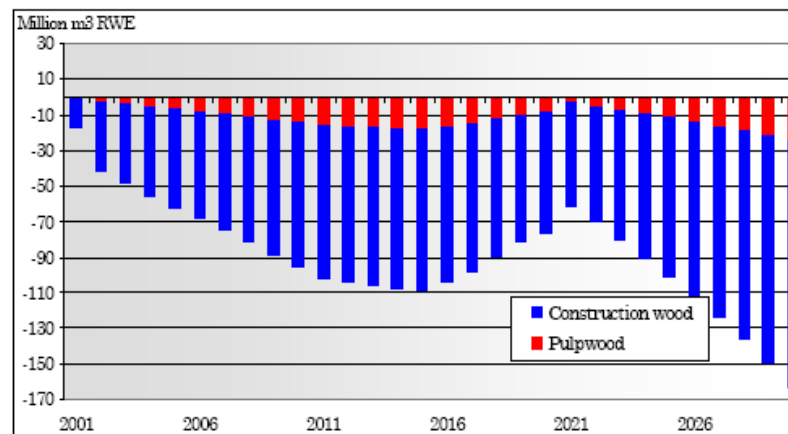
Rentabilidade histórica favorável face a Classes Tradicionais de Activos

Pressão sobre a Procura – exemplo Internacional

Importação (por fornecedor) de troncos e madeira serrada (China, 2004)

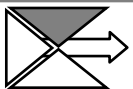


Balanço de madeira (China, 2030)



10 Mm3 em 1999 – 26.2 Mm3 em 2004 – 118 Mm3 em 2015

Historicamente os “Activos Florestais” apresentam uma Rentabilidade superior em relação aos Activos Tradicionais de Risco Semelhante



Rentabilidade histórica favorável face a Classes Tradicionais de Activos

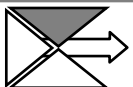
Pressão sobre a Procura - Portugal

- Centrais termoeléctricas a biomassa (250 MW) > 2,5 Mton/ano
- Crescimento da Co-geração c/ biomassa (Celuloses, Cerâmica, Serrações, Aglomerados)
- Crescimento da Co-combustão c/biomassa (Cimenteiras, Termoeléctricas tradicionais)
- Médio-prazo > produção de bioetanol a partir de biomassa
- Aumento da capacidade industrial (pasta para papel e aglomerados)
- Abertura de novos mercados

Pressão sobre a Oferta

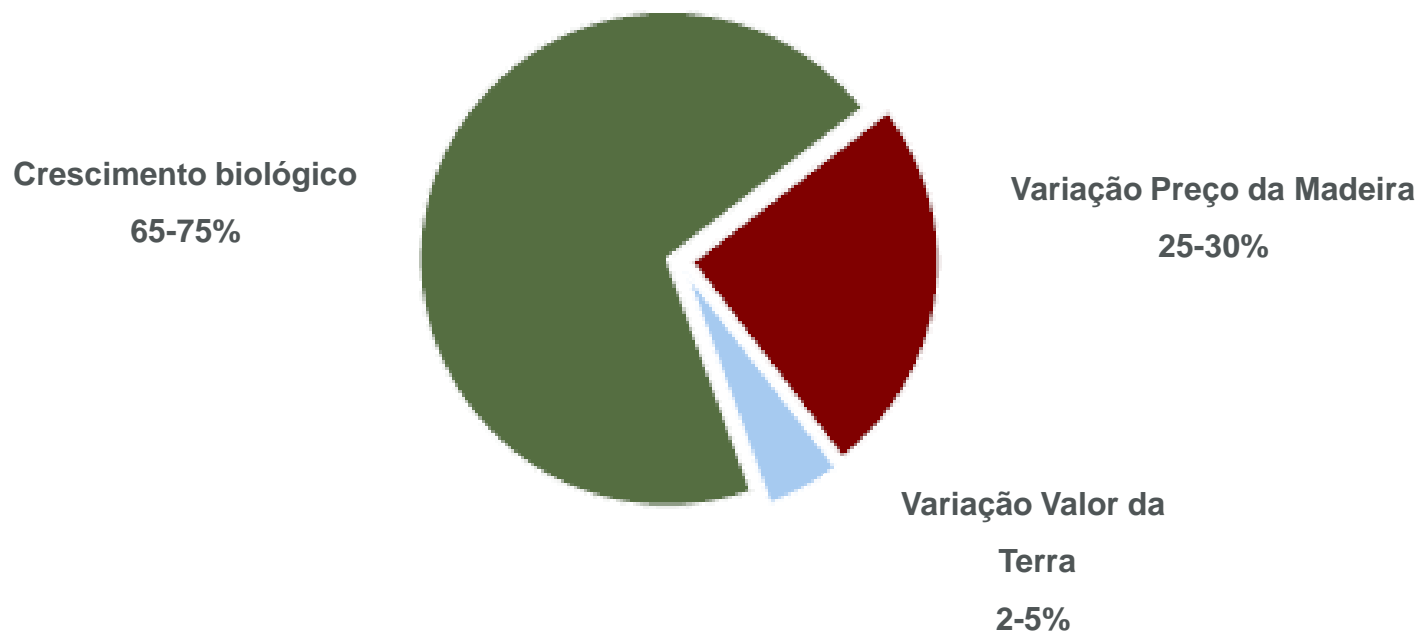
- Restrições ao abate de florestas tropicais (Convenção da Biodiversidade, Acordos de Bali)
- Aumento dos custos de transporte (importação)
- Certificação da Gestão Florestal Sustentável (Prolongamento do ciclo de exploração)
- Degradação dos Recursos Naturais

Historicamente os “Activos Florestais” apresentam uma Rentabilidade superior em relação aos Activos Tradicionais de Risco Semelhante

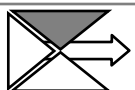


Rentabilidade histórica favorável face a Classes Tradicionais e Activos

Fontes de rentabilidade do Activo Florestal



Historicamente os “Activos Florestais” apresentam uma Rendibilidade superior em relação aos Activos Tradicionais de Risco Semelhante

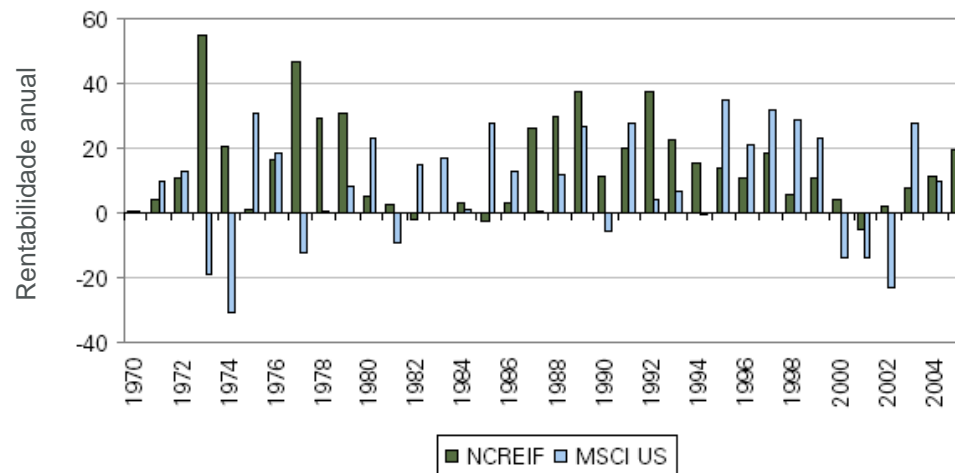
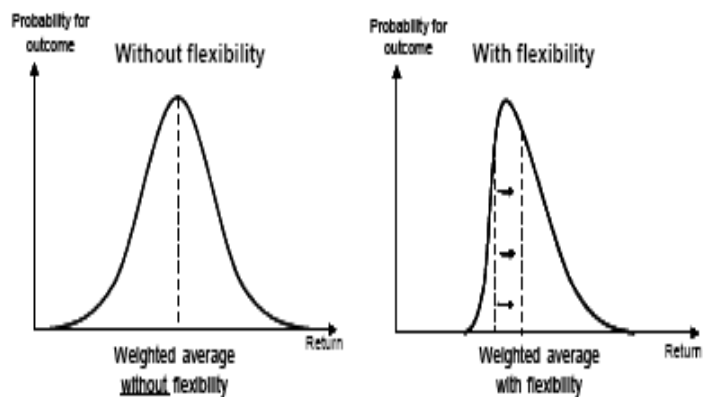


Rentabilidade histórica favorável face a Classes Tradicionais de Activos

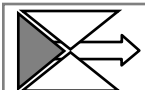
Estrutura de Rentabilidade Assimétrica

Classe de Activos que permite uma gestão flexível (adiamento do momento de corte)

Rentabilidade positiva muito elástica
Rentabilidade negativa quase inelástica



O perfil rentabilidade-risco de um dado *portfolio* poderá ser melhorado com a inclusão de “Activos Florestais”

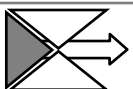


Rácio Rentabilidade-Risco de uma carteira melhorado

Fronteira de Eficiência Com e Sem Alocação em Activos Florestais

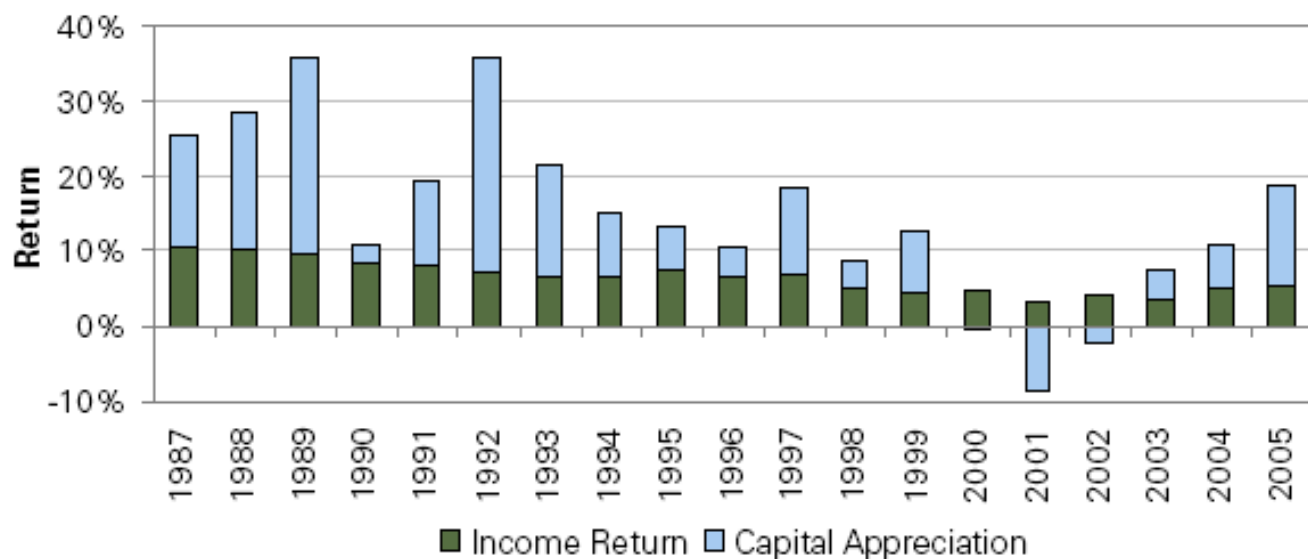


O perfil rentabilidade-risco de um dado *portfolio* poderá ser melhorado com a inclusão de “Activos Florestais”

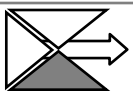


Rácio Rentabilidade-Risco de uma carteira melhorado

Peso relativo das componentes de *cash-flows* e valorização do capital na rentabilidade do Investimento



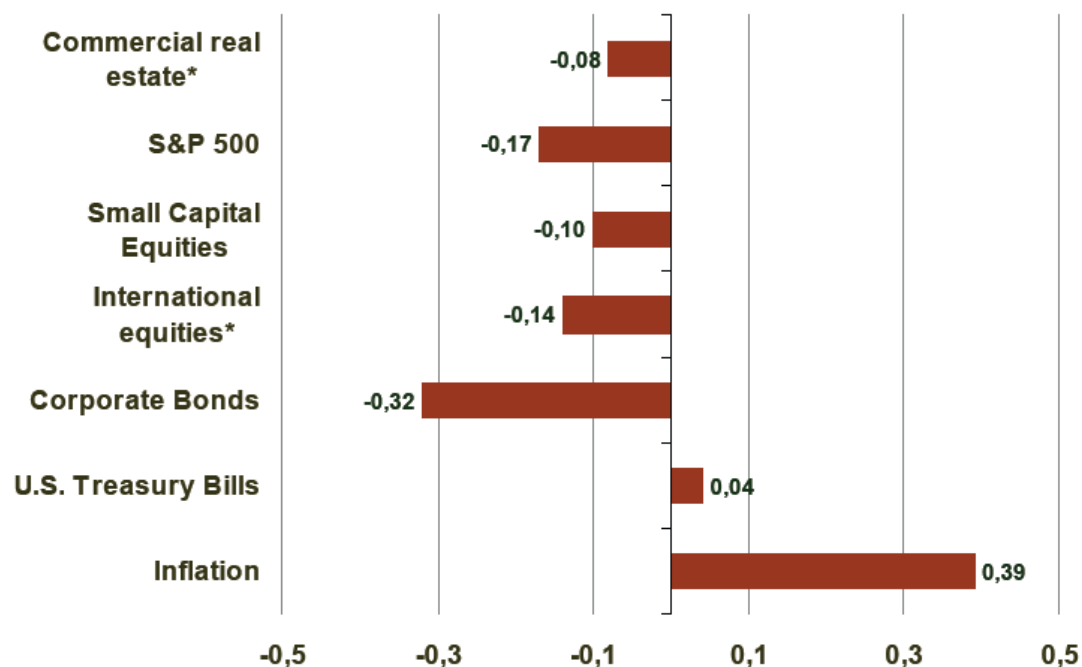
O Investimento em Activos Florestais constitui um excelente veículo para a diversificação e proporciona um horizonte de investimento alargado



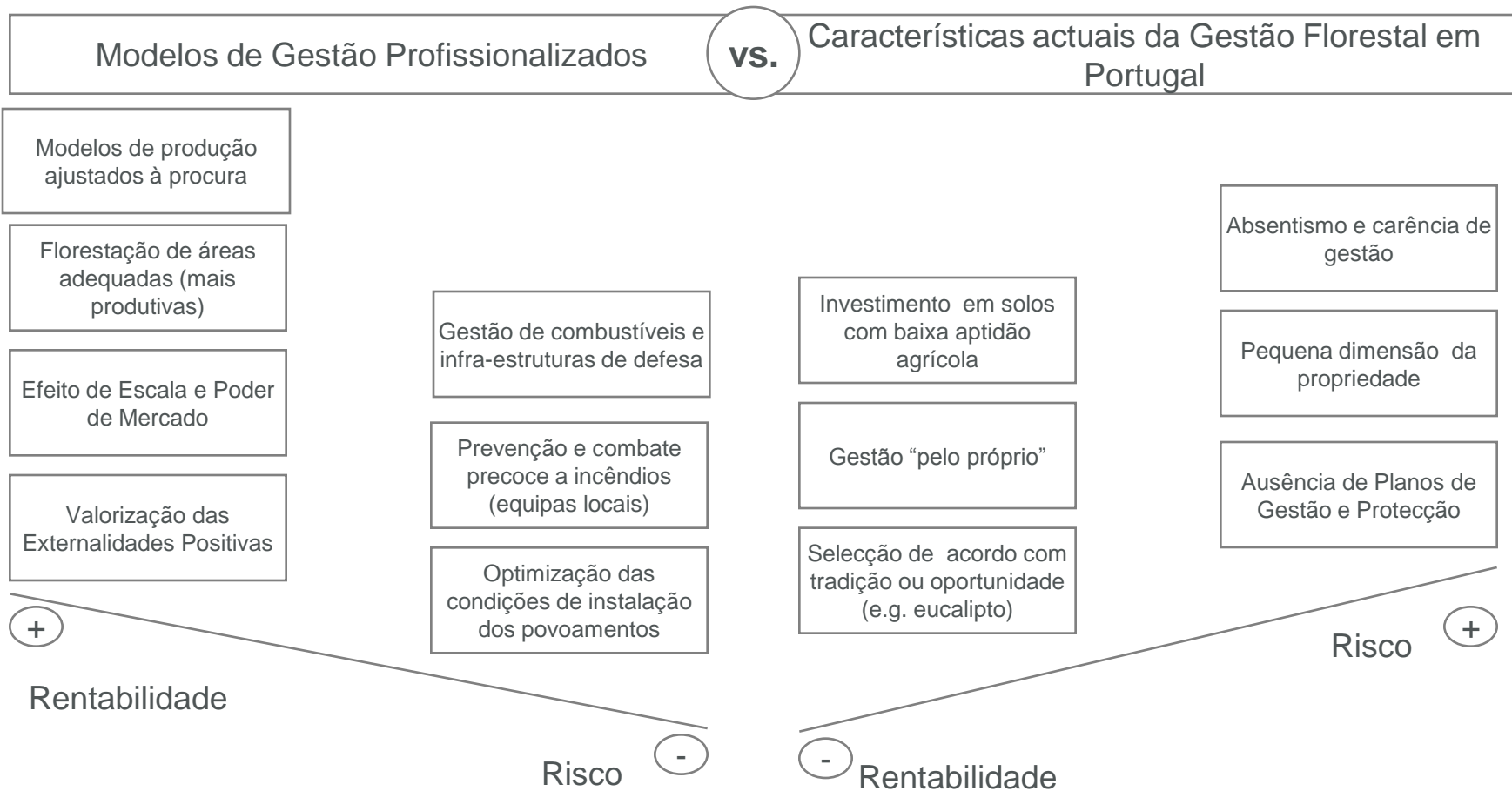
Correlação Baixa ou Negativa com Classes Tradicionais de Activos

Correlação com Rentabilidade do Investimento Florestal, EUA, 1960-2002

Timber vs Real Estate, Bonds, Treasury Bills, Equity, Inflation



A Floresta pode constituir um investimento muito atractivo com a operacionalização de melhores práticas de gestão



Aprovado o Primeiro Fundo Floresta Atlântica (“Fundo”), a Floresta Atlântica SGFII, SA pretende iniciar o processo de subscrição de Unidades de Participação (“UP”)



**DESCRIÇÃO
DO FUNDO**

- Primeiro Fundo de Investimento Imobiliário Florestal Português, sob a forma de Fundo Especial de Investimento Imobiliário Fechado, de subscrição particular, com duração de 10 anos, prorrogável, com um montante de 20 milhões de euros
- Maioritariamente detido por privados, beneficia do apoio de capitais públicos, nacionais e comunitários, através do IFAP, IP, traduzindo-se na:
 - (i) distribuição pelas UP detidas pelos participantes privados (UP de categoria B) da remuneração atribuível às UP detidas pelo IFAP, IP (UP de categoria A);
 - (ii) no estabelecimento de privilégios de reembolso na liquidação do Fundo aos detentores privados de capital, garantindo na maturidade 50% do valor investido.

**POLÍTICA DE
INVESTIMENTO
DO FUNDO**

- Aquisição de prédios rústicos, ou do respectivo direito de superfície, com potencialidades para as seguintes actividades:
 - Produção e exploração florestal, com base na instalação de novos povoamentos e gestão de povoamentos existentes, com predomínio da espécie de pinheiro-bravo
 - Animação turística relacionada com o turismo de natureza, turismo cultural em meio rural e desporto ao ar livre, incluindo a aquisição e adaptação de prédios urbanos para apoio
 - Gestão e exploração de concessões de zonas de caça turística
 - Promoção da produção e exploração de todos os recursos silvestres ocorrentes
 - Promoção da produção e valorização das externalidades positivas
 - Arrendamento de superfície para utilizações não conflitantes com o uso florestal.

**POLÍTICA DE
INVESTIMENTO
DO FUNDO**

- Promoção de Boas Práticas;
- Formação de prestadores de serviços;
- Certificação da GFS;
- Desenvolvimento de novos mercados;
- Diversificação de actividades e segmentos de produto;
- Parcerias com agentes locais;
- Parcerias com autoridades nacionais/internacionais;
- Parcerias com Instituições de Investigação Científica.

Variável	Magnitude (%)	Varição Rentabilidade Líquida (%)
Acréscimo do valor de mercado da madeira	+ 5 a 30	+ 0,46 a 2,55
Acréscimo das receitas por venda de biomassa residual	+ 10 a 20	+ 0,85 a 1,64
Venda de Carbono no mercado voluntário		+ 0,19 a 0,75
Venda de Carbono/Bio no mercado voluntário		+ 0,30 a 1,20
Venda de madeira de qualidade (folhosas)		+0,05 a 0,50
Venda de direitos de caça turística		+ 0,02 a 0,08

➤ Periodicidade da cotação das Unidades de Participação (UP)

- ✓ Mensal (com valor reportado às 18.00h do último dia do mês respectivo)

➤ Critérios de valorização do Activo

- ✓ Valor venal dos prédios obtido através da média de duas avaliações independentes
- ✓ Decomposição da avaliação: valor da terra + valor de mercado das existências (actuais e futuras)
- ✓ Reavaliações bienais ou sempre que se verifiquem alterações significativas

➤ Transacção das UP

- ✓ É possível a transacção das UP em qualquer momento da existência do Fundo

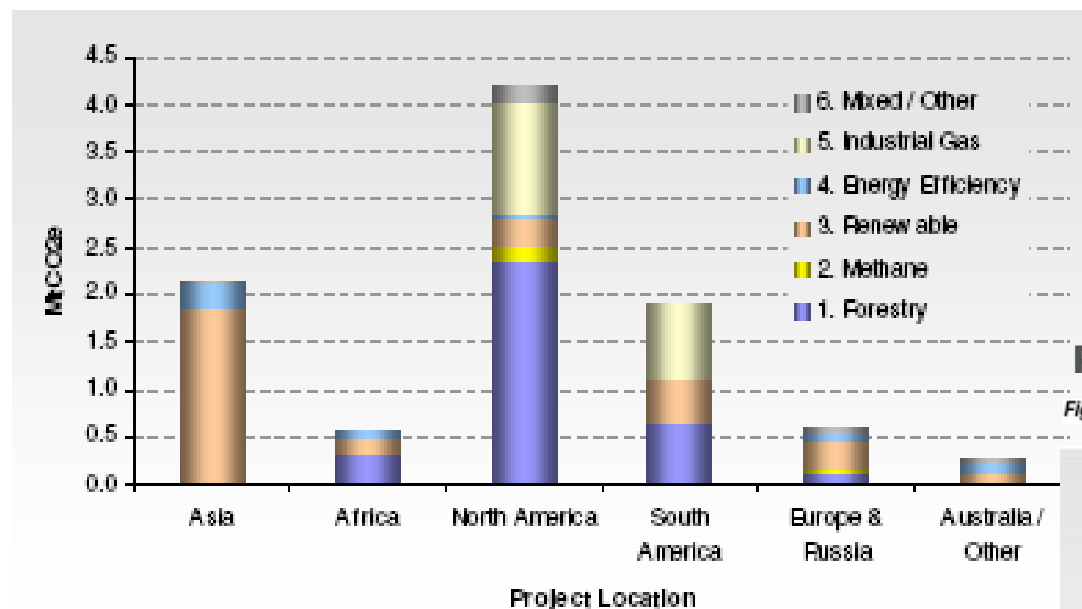
➤ Benefícios fiscais dos FIIF

- ✓ Isenção de IRC dos rendimentos obtidos pelo Fundo
- ✓ Isenção de IMI e IMT
- ✓ Retenção na fonte de IRS ou IRC, à taxa de 10%, para os rendimentos das UP

Descrição	Accionistas
<ul style="list-style-type: none">▪ O FUNDO é administrado pela FLORESTA ATLÂNTICA – Sociedade Gestora de Fundos de Investimento Imobiliário, S.A.▪ Apresenta como principal missão concretizar o objectivo estratégico de promoção do desenvolvimento sustentado da floresta, através do empenhamento da iniciativa privada▪ Objectivos estratégicos:<ul style="list-style-type: none">▪ implementação de mecanismos de gestão que promovam a eficiência e o lucro;▪ Promoção de parcerias entre o Sector Público e Entidades Privadas na criação e promoção de novos instrumentos na área florestal▪ Criar um “efeito de demonstração” que suscite o interesse pelo lançamento de novos fundos de investimento florestal e de novas sociedades gestoras.	<ul style="list-style-type: none">▪ A Floresta Atlântica – SGFII, S.A. é uma sociedade anónima constituída em Junho de 2007, com um Capital Social de 375.000 Euros.▪ Accionistas - % capital:<ul style="list-style-type: none">▪ Instituto de Financiamento da Agricultura e Pescas, IP (IFAP) - 46%▪ Caixa Geral de Depósitos (CGD) – 13,5%▪ Crédito Agrícola-SGPS, S.A. (Grupo Caixa de Crédito Agrícola Mútuo) – 13,5%▪ Banco Espírito Santo (BES) – 13,5%▪ Orey Financial-SGPS, S.A. (Grupo Orey) – 13,5%

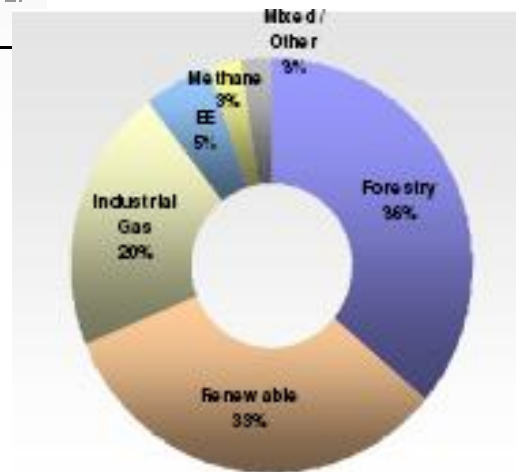
Localização

Figure 2. Transactions by project location, 2006 (9.7Mt)



Perfil projectos

Figure 3. Transactions by project type



Fonte: Ecosystem Marketplace and New Carbon Finance, 2007. State of the Voluntary Carbon Markets 2007.

Exemplo de Valorização

Mercados Voluntários de Carbono – Iniciativas/Marcas



Reino Unido

.....
The CarbonNeutral Company



Canadá



Brasil



Austrália



EUA



Portugal



Mercados Voluntários de Carbono – Uma preocupação, diferentes abordagens



Porquê?

reduzir a factura energética

envolver *stakeholders*

diferenciar a oferta

comunicar responsabilidade corporativa

Exemplo de Valorização

Mercados Voluntários de Carbono - Tendências



Code of Good Practice
for Voluntary Carbon
Offsetting



The Greenhouse Gas Project
The foundation for sound and

INCIS Voluntary Offset Standard



International
Organization for
Standardization

ISO 14064-2 –
Greenhouse
gas emissions
reporting



Clean
Development
Mechanism (CDM)



CCB Standards
The Climate, Community & Biodiversity Alliance



VER+ Standard
The Gold Standard
Premium quality carbon credits



Chicago Climate Exchange



CarbonoZero é uma marca Portuguesa, desenvolvida por entidades nacionais com reconhecida competência nas áreas da economia do carbono, comunicação e gestão florestal, e assente na floresta, enquanto recurso endógeno.

CarbonoZero trás para Portugal, pela primeira vez, o conceito de compensação de emissões, dando a empresas e cidadãos a possibilidade de agir de forma concreta no combate às alterações climáticas e valorizando, simultaneamente, um dos mais importantes recursos renováveis do País.



a E.Value, responsável pelo desenvolvimento global do produto, pela componente técnica de quantificação de emissões e pela colocação do produto no mercado.

www.evaluate.pt



BRANDIA CENTRAL
branding leaders

a Ipsis | Brandia Central, parceiro de comunicação CarbonoZero, co-responsável pela definição e implementação da respectiva estratégia de comunicação e pelo desenvolvimento de soluções de comunicação específicas para clientes empresariais.

www.ipsis.pt



a AFLOPS – Associação de Produtores Florestais, co-responsável pela definição de critérios e selecção das áreas florestais e pela contabilização do respectivo sequestro de carbono.

www.aflops.pt

- As áreas florestas que integram a bolsa de projectos CarbonØ devem cumprir um conjunto de critérios:
 - instalação posterior a 1998
 - ausência de ocupação florestal nos 6 anos anteriores a 1998, excepto em situações de incêndio, intempéries ou abate por razões justificadas
 - mínimo de 80% de espécies indígenas ou naturalizadas de Portugal Continental
 - ausência de espécies classificadas como invasoras
 - PGF que cumpra requisitos legais e requisitos adicionais
 - modelo de exploração superior a 30 anos
 - acesso pelos clientes CarbonØ, mediante condições pré-estabelecidas

Exemplo nacional – contratação, monitorização e *backup*



- Estimativa inicial para - base de estabelecimento da relação contratual
- Contrato de futuros a 30 anos
- Monitorização quinzenal – informação para ajuste das condições contratuais
- Obrigação de reporte de desvios ao PGF
- Aprovação do PGF pela CarbonoZero
- Partilha de risco de não permanência do carbono entre o proprietário e a CarbonoZero
- Backup cruzado em áreas do portefólio que garante bolsa de reserva com capacidade de sequestro estimada em cerca de 10% dos créditos vendidos em cada momento.

Exemplo nacional – Verificação



- CarbonoZero é sujeito a verificação externa independente, realizada anualmente pela multinacional de consultoria e auditoria Deloitte, sendo os resultados divulgados publicamente.
- Esta verificação destina-se a avaliar se os critérios, métodos e procedimentos que utilizamos para contabilizar emissões, seleccionar projectos de compensação, alocar os créditos de carbono e gerir todos os fluxos financeiros são aos adequados e se os utilizamos efectivamente na forma como gerimos o CarbonoZero.
- Com este processo pretendemos demonstrar a aplicação efectiva dos princípios de credibilidade, rigor e transparência associados ao CarbonoZero, construindo e mantendo um capital de confiança e reconhecimento públicos em relação à marca.

Deloitte.

- Para a contabilização de emissões, o CarbonoZero utiliza a metodologia do The Greenhouse Gas Protocol, desenvolvido pelo World Business Council for Sustainable Development em colaboração com o World Resources Institute.
- São utilizados os factores de emissão definidos pela Convenção Quadro das Nações Unidas para as Alterações Climáticas, ajustados à realidade Portuguesa, com base em dados publicados por entidades oficiais nacionais. Todos os resultados são apresentados em dióxido de carbono equivalente (CO₂e).
- O sequestro de carbono nas áreas florestais utiliza a ferramenta de modelação CO₂FIX, recomendada pelas Nações Unidas, calibrada com dados específicos de espécies florestais nacionais.
- A efectiva retenção de carbono é verificada através de monitorizações no local, realizadas quinzenalmente, ao longo de um período de 30 anos. Os resultados são apresentados em CO₂e.

Exemplo nacional – Impacto na conta de exploração (ha/30 anos)



- Pinhal bravo de qualidade média (6,5 m³/ha/ano)
- Produção de 195 m³ de madeira em 30 anos – 110 ton madeira seca
- 110 ton madeira seca – cerca de 202 ton CO₂ (só biomassa aérea, excluindo copa)
- Remuneração de 8 euros/ton CO₂ (5€ CO₂, 3€ PGF e Monitorização)
- Tx actualização: 6%
- Preço de venda da madeira em pé: 22,5 €/ton
- Receita de madeira: 2475 €/30 anos 82,5 €/ano
- Receita de carbono: 1000 €/30 anos 33 €/ano
- VA Madeira: cerca de 435 €
- VA Carbono: cerca de 467 €

- **Existência de caderno de requisitos para as áreas florestais a contratar;**
- **Plano de diagnóstico (baseline)**
- **Plano de Gestão Integrado;**
- **Plano de Monitorização;**
- **Verificação independente**
- **Criação de um *standard* nacional único;**
- **Criação de economias de escala (Carbono – 20€/ton; Biodiversidade – 70€/ano) para redução de custos;**
- **Inventários regionais/locais de biodiversidade**

Empresas disponíveis para remunerar o serviço “Biodiversidade”?

Programas de financiamento público dos serviços ambientais

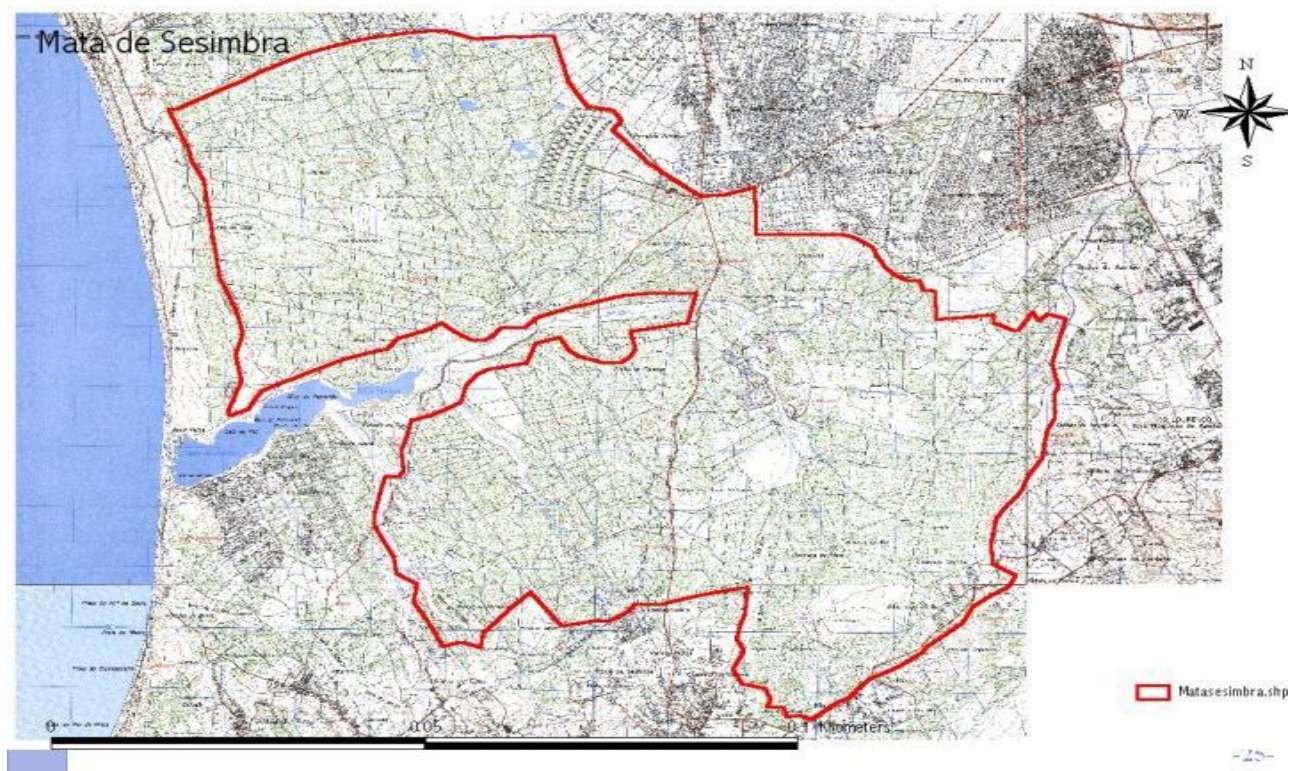


- FUNDO FLORESTAL PERMANENTE
- FUNDO PORTUGUÊS DE CARBONO
- MEDIDAS AGRO-AMBIENTAIS
- MEDIDAS SILVO-AMBIENTAIS

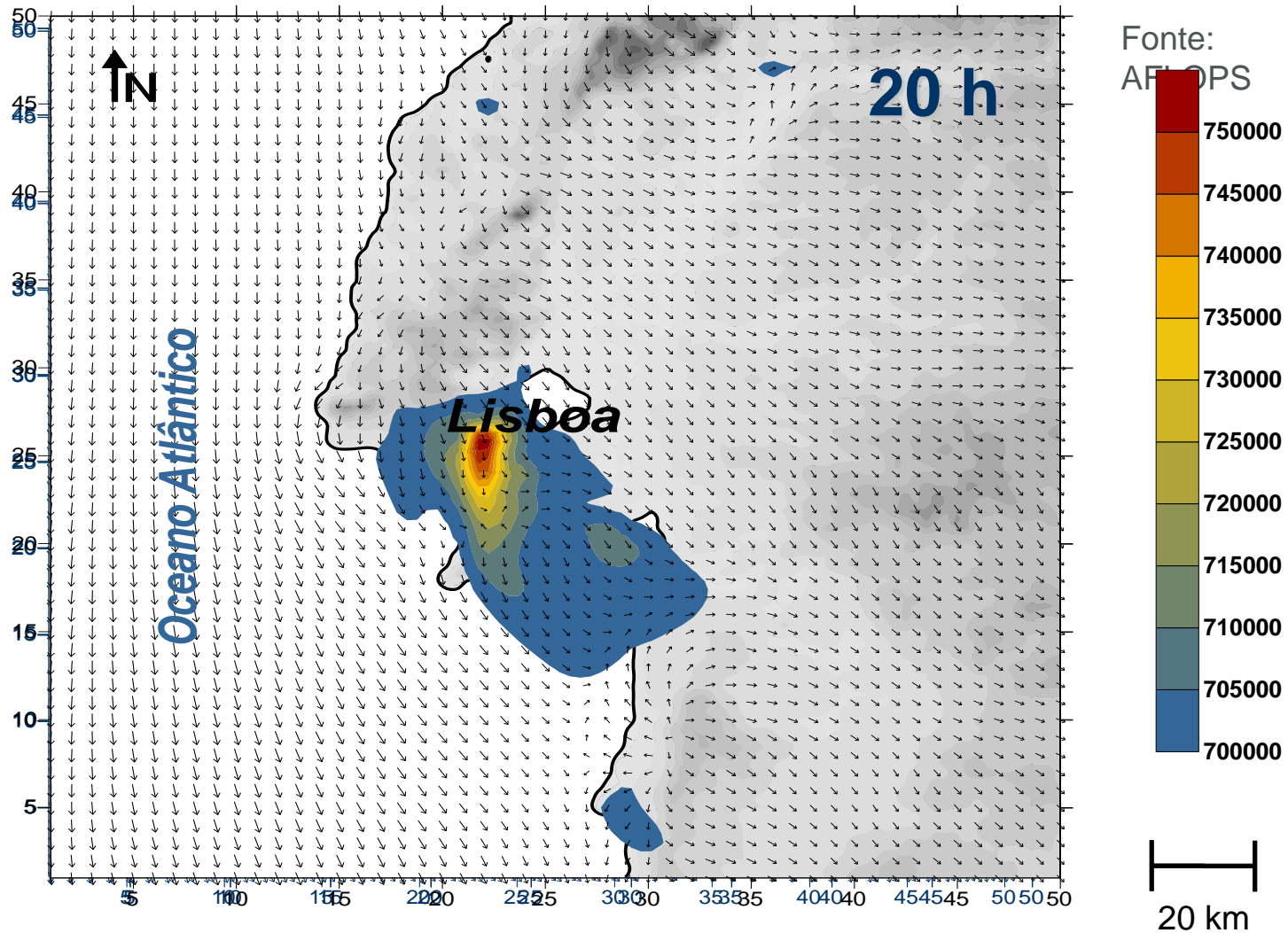
#3: Outros casos de valorização de serviços ambientais da floresta

Aplicação de Perequação na Mata de Sesimbra

- Transferência de direitos construtivos, previstos em PDM, das áreas florestais para área turística
- Pagamento de “taxa de condomínio ambiental” do empreendimento aos proprietários da mata
- Participação na gestão das actividades lúdicas e de educação ambiental que utilizem a Mata.



Serviço de despoluição atmosférica no Distrito de Setúbal



Remoção de poluentes pelas árvores

Exemplos de Remoção de Poluentes pelas Árvores (unidade: 10^3 kg ano^{-1})

Poluente	Nova York	Atlanta	Sacramento
Ozono	506	514	603
Partículas em suspensão ($< 10 \mu$)	470	406	679
Dióxido de azoto	510	145	148
Dióxido de enxofre	238	95	27
Monóxido de carbono	97	35	-
Total	1821	1196	(1457)

Adaptado de:

Harris, R. W., J. R. Clark & N. P. Matheny. 2004. *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines*. 4ª Edição. Prentice Hall, N. Jersey.

Remuneração directa do carbono pela indústria CELE



Quando uma instalação industrial listada no Anexo I da Directiva CELE consome uma tonelada de biomassa florestal para a produção de energia, sendo a biomassa carbono neutra, em substituição de uma determinada quantidade combustível fóssil, a emissão de carbono fóssil que é evitada pode ser vendida pelo operador da instalação, sobre a forma de LE, a preços de mercado.

Estima-se que uma tonelada de resíduo florestal (árvores de dimensão não comercial e resíduos de abate) consumida em substituição de carvão e fuelóleo evita a emissão de 1,5 e 1 tonelada, respectivamente.

Com um preço de referência para a tonelada de CO₂e de 25€, tal representa uma valorização do CO₂ evitado entre 25€ a 37€.

(Pressupõe-se a biomassa com 30% de humidade, custo de t de carvão a 26,16€ (7288 Kcal/Kg), custo de t de fuelóleo a 74,49€ (9600 Kcal/Kg))

Floresta Atlântica – SGFII, SA

www.floresta-atlantica.pt

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