

Diversification in the use of forest resources

Onaindia, Miren*
Univ. of the Basque Country
Dept. of Plant Biology and Ecology
P.O. Box 644
48080 Bilbao

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Gizakiek planetako baliabideen gainean egiten duten presioaz gero eta kontzientziario handiagoa dago eta, horren ondorioz, basoen eta basoko ekosistemen babes, kontserbazio eta gestio eramangarriaren premia agerian geratu da. Azken 40 urteetan, Euskal Herrian koniferoen landaketak eta sasizak emendatu egin dira nabarmenki eta, ondorioz, zuhaitz hostogalkorreko basoak eta erriberakoak urritu egin dira. Baldin eta helburua basoaren ustiapen eramangarria lortzea bada, baso-ekosistema osoaren jarraipena egiteko premia handia dago, bai eta basoei buruzko estatistiketan ingurugiro-alderdiak eta datu sozioekonomikoak erastekoa ere.

Giltz-Hitzak: Landare-aniztasuna. Kontserbazioa. Garapen eramangarria. Euskal Herria.

La creciente concienciación sobre la presión humana sobre los recursos del planeta ha subrayado la necesidad de la protección, conservación, y gestión sostenible de los bosques y de los ecosistemas del bosque. En los últimos 40 años en el País Vasco, se ha producido un importante aumento de plantaciones de coníferas y de terreno con matorros con la consiguiente reducción de los bosques caducifolios y ribereños. Hay una fuerte necesidad de realizar un seguimiento de la totalidad del ecosistema del bosque, y de incorporar aspectos medioambientales y datos socioeconómicos en las estadísticas sobre bosques si el propósito es lograr una explotación sostenible del bosque.

Palabras Clave: Diversidad de plantas. Conservación. Desarrollo sostenible. País Vasco.

La prise de conscience croissante sur la pression humaine sur les ressources de la planète a fait ressortir la nécessité de la protection, conservation et gestion soutenable des forêts et des éco-systèmes de la forêt. Au cours des dernières 40 années dans le Pays Basque, il s'est produit une augmentation importante de plantations de conifères et de terrain à buissons avec la réduction consécutive des forêts à feuilles caduques et riveraines. Il est grandement nécessaire de réaliser un suivi de la totalité de l'éco-système de la forêt, et d'incorporer des aspects de l'environnement et des données socio-économiques dans les statistiques sur les forêts si l'intention est d'obtenir une exploitation soutenable de la forêt.

Mots Clés: Diversité de plantes. Conservation. Développement soutenable. Pays Basque.

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WOOD: A ESSENTIAL COMMODITY

The type of vegetation that exists in a specific area is determined by the interactions which exist between climatic and edaphic factors. Furthermore, vegetation type can be influenced by topography, other living organisms and evolutionary pressures. On the other hand, soil composition is affected by the vegetation which it supports, resulting in a co-evolution of soil and vegetation. This intimate relationship has produced a range of ecosystems on a grand scale on this planet, of which forests make up an important part, both quantitatively and qualitatively.

Throughout evolution the human species has had a close relationship with forests. Wood and other forest products have been important elements in the evolution of human culture. Simultaneously, the human race has had a major impact on forests. Prior to 10,000 BC, these effects were minimal. Forests did not suffer directly from the activities of hunter-gatherers, bearing in mind their extremely low population density. Despite the fact that fire was used as an essential resource by hunter-gatherers, only relatively small areas of forest suffered damage.

Man's first significant impact on forest came with the development of agriculture and the use of metals, the production of which required fire (and therefore wood as fuel). However, the first *major* impact on forests came with mankind's first large-scale wars in Egyptian times; wood being an important raw material for the construction of warships and the manufacture of weapons.

World-wide wood consumption is currently running at 4.7 billion m³ per year, whilst total wood stock is calculated as being approximately 340 billion m³ (Sharma, 1992). Despite the intense efforts made to replant forests in the period since World War II, plantations only account for 10% of wood used for industry. The remaining 90% comes from natural forests.

SOIL USAGE: THE CASE IN THE BASQUE COUNTRY

During the last 250 years, Basque forests have been in a state of uninterrupted decline and degradation, especially those nearest the Atlantic coast. By the end of the eighteenth century, deforestation was already a well-documented reality in Bizkaia and Gipuzkoa. During the nineteenth century, deforestation increased at an alarming rate. Some of the main causes of the decline in forest coverage, up until the mid-twentieth century, are mentioned below:

The demand for charcoal grew dramatically in the eighteenth century, due to the production of iron in foundries, for use in the farming and shipbuilding sectors. From the end of the eighteenth century onwards, public forests in Bizkaia and Gipuzkoa were privatised. This privatisation brought with it the intensive exploitation of forests by the commercial sector. On occasions the aim of forest exploitation was only to obtain the maximum possible profit in the shortest amount of time. Furthermore, towards the end of the nineteenth century and the beginning of the twentieth, oak and chestnut forests were decimated, ravaged by various diseases. These two species had previously been the most abundant in low-medium elevation areas in the Basque Country.

In comparison to previous centuries, the areas of native beech, oak (including Holm oak and Kermes oak), ash and alder forests in Bizkaia and Gipuzkoa are now tiny. In contrast, there has been a much greater level of conservation in Alava and Navarra.

Soil use has been dictated largely by topography and industrial development. In terms of production from the soil itself, Bizkaia is currently the least productive province in the Basque Country followed by Gipuzkoa (Gobierno Vasco, 1994). Unproductive areas included strictly unproductive agricultural land, together with industrial and urban areas. On the other hand, topographical factors have also been decisive in land use, from the point of view of productivity. The highest percentage of arable and meadow land is to be found in Navarra (Arrizabalaga, 1991), followed by Alava.

The *Basque Country Autonomous Community Forest Inventory*, published by the Basque Government in 1986, details the current distribution of different forest types in the Basque Country. Exotic coniferous species, mainly *Pinus radiata* make up a large percentage of forest coverage. This species can achieve growth levels of $27 \text{ m}^3\text{ha}^{-1}\text{a}^{-1}$ in good quality soils, and just in $7\text{m}^3\text{ha}^{-1}\text{a}^{-1}$ poorer quality soils (species which reach growth rates of $>10 \text{ m}^3\text{ha}^{-1}\text{a}^{-1}$ are considered to be fast-growing). In Bizkaia and Gipuzkoa, this pine species makes up 65.5% of total forest coverage, whilst in Alava and Navarra it constitutes just 11% and 2.6% respectively. The Basque Country was one of the first areas in the Iberian peninsula to introduce fast-growing species such as *P. radiata*. Towards the end of the nineteenth century, a Bizkaian land-owner, Adán de Yarza, carried out the first mass plantation of *P. radiata*. Since then, the Basque Country has had the largest number of fast-growing species plantations in Europe.

Today, native beech and oak forests are scarce in Bizkaia and Gipuzkoa. Holm oak makes up just 4.6% of total forest coverage in Bizkaia, whilst oak makes up 3.8% and beech 2.5%. In Gipuzkoa the figures are 2.1% for Holm oak, 2.1% for oak and 14% for beech. In Alava and Navarra, native forest types appear to have been conserved to a greater extent, (13.5% Holm oak, 25.4% gall oak and 21.2% beech in Alava; 8.5% Holm oak, 15.6% oak (& chestnut), and 39% beech in Navarra).

During the last 40 years, several changes have occurred in land use patterns in the Basque Country. The land covered by meadows, hedges, orchards as well as deciduous and riparian forests has decreased. On the other hand, the area covered by coniferous plantations and scrubland has increased (Martin de Agar *et al.*, 1995).

THE FOREST SYSTEM

Forests are complex physical and biological systems, with a plethora of interactions and a high degree of interdependence existing between their components. In order to understand the functioning of such a system, and the deleterious impacts that it may suffer, it is important to comprehend the components of the system and their interactions. Such an understanding is also important when attempting to predict changes due to a specific factor at a global level. The maintenance of natural soil nutrient levels and hence biogeochemical cycles, should be a central tenet of sustainable forest development policy. Trees contain nutrients, and thus the removal of biomass from forests results in a decrease in soil nutrient levels - the extent of which depends on the intensity of forest exploitation. In addition, forest operations and the opening up of tracks for logging vehicles are major causes of soil movement and erosion in forests. The use of fast-growing species in short rotation plantations results in the large-scale removal of biomass and nutrients from forests. This could lead to the depletion of soil nutrient reserves and could therefore decrease forest productivity (Edeso *et al.*, 1995). Furthermore, such activities could result in serious alterations in soil structure (soil compaction) and nutrient dynamics.

DIVERSIFICATION IN FOREST USE

The strong social demand for the environment as a whole to be available for tertiary uses (i.e. cultural, recreational and educational uses), and forests in particular, necessitates a wider review of forestry policy. As such, there is a need to formulate forest management policy to combine commercial interests, biodiversity and other social uses.

The protection of soil and hydrological resources, the conservation of biodiversity and the production of commercial wood products, should be combined in a progressive and balanced manner. This is of special importance in the Basque Country, which has a high population density and an extremely high intensity of land use.

The great diversity in forest species and stand ages in the Basque Country lends itself ideally to the combination of the disparate factors outlined above. Furthermore, such a situation promotes a diversification in the form and colour of forests, whilst at the same time helping to maintain the natural landscape. Tree stands in the Basque Country are ideal for the development of diverse forms of flora and fauna. The existence of various different conditions within forests facilitates the maintenance of diverse animal populations and helps to limit the effects of disease on them.

However, the introduction of single-species plantations has been a common feature throughout Europe during the last 50 years. Some countries such as Great Britain reversed this trend since 1975, when the so-called "Standard Deciduous Mix" of *Tilia cordata*, *Acer campestre*, *Prunus avium* and *Alnus glutinosa* was introduced. However, such plantations are almost exclusively used for recreational purposes (Kerr *et al.*, 1992). The exploitation of mixed plantations for timber production has been carried out by successive felling. On occasions the oldest parts of a plantation are used as protection for the introduction of a new forest species.

In the former West Germany, more than 50% of forests are made up of single-species plantations, by which the original conifer: deciduous tree ratio of 1:3 has been reversed in favour of coniferous species (Kenk, 1992). Economic factors have been decisive in the trend towards the planting of single-species coniferous forests. Despite this, the importance of the maintenance of mixed forests was recognised by German authorities as long as a century ago. As such, the use of mixed forests adapted to definite situations has formed the basis of silvicultural policy throughout the last decade. In the last German Forest Inventory, performed in 1987, 729 different mixtures of forest species were recorded.

A knowledge of the appropriate mixture of species and their growth rates, together with good forest management, are fundamental to the success of mixed plantations. The correct proportions of species in mixed plantations, and optimal ambient conditions, can be worked out relatively easily. By combining these factors with economic projections and the needs of the marketplace, a progressive planning strategy can be formulated for mixed forests.

TOWARDS THE SUSTAINABLE DEVELOPMENT OF FOREST RESOURCES

The projected growth of the human population is not likely to be paralleled by a similar growth in forest coverage. On the contrary, it is to be expected that many countries will decrease their forest coverage during the next century, due to the increase in other soil uses, above all for agriculture. As such, it is probable that plantations of fast growing trees ("working forests") will increase in number. Such a fast turnover, combined with the removal of all above-ground biomass will inevitably result in a continual loss of nutrients from the soil. This issue began to be exhaustively addressed by scientists in the 1970s (Kimmins, 1997).

In developed countries, the 1980s saw the birth of widespread concern over the depletion of natural resources, especially due to population growth, pollution and so on. The maintenance of biodiversity, especially with respect to tropical rainforests also became a key issue during the 1980s. In developed countries the 1990s have also witnessed a confrontation between sustainability and the maintenance of biodiversity, again with respect to tropical forests. However, the loss of biodiversity has also become a cause for concern at a regional and local level.

Since the 1992 Rio Conference, the term Sustainable Development has entered the public domain. The term is generally taken to mean the use of resources without endangering their future viability.

However, putting this principle into practice is difficult. With respect to forests, it is difficult to define what constitutes sustainable development, especially when different geographical locations and time-frames are involved.

Of course, it is vital to bear in mind the fact that forests need to provide their owners with economic benefits. This fact often puts the commercial sector at odds with the idea of defending the environment as a "Common heritage".

Another important issue is the control exerted over environmental resources by governments/administrations and the lack of dialogue between the scientific and technical sectors during the decision-making process.

When it comes to defining proposals or formulating policy in this sector, there is an additional difficulty. This is namely, the relatively long time period inherent in the exploitation of forest resources.

It must be recognised that we need to achieve a more profound understanding of forest ecosystems, in addition to the development of better modelling methods.

Were this to be achieved, the objective would be to reach a balance between the exploitation and conservation of forest resources, together with a greater diversification in land use. The result of this would be a resource management policy based on scientific knowledge and the integration of public and private interests.

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