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Man, forestry, and forest landscapes. Trends and perspectives in the evolution of forestry and woodland history research¹

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1. From practice to science: the origin of forestry

Most of the present approaches in forestry and forest history, as well as their potential to meet and explain the present problems of sustainable development can be understood with a retrospective analysis. Modern forestry developed as the result of a process that originated in the Enlightenment, when traditional practical knowledge was systematized in an effort to develop a body of scientific disciplines whose main purpose was to ensure the steady wood supply. Until then, forestry techniques had been based on information handed down by Greek and Roman authors. During the medieval period forestry techniques were particularly well developed in the Venetian Republic, whose dominant shipping power in the Mediterranean was tightly connected to the high technical level of its forestry and the strong control it exerted on forest resources through the most advanced forest legislation in Europe. Its forest management was based on selective cutting, uneven-aged stands and repeated forest inventories and its forest utilization and transport systems were well organized (AGNOLETTI 1994). The Venetians also experimented with the negative affects of growing pure stands of broadleaved trees, in their attempt to increase the amount of oak timber available for shipbuilding, as later experienced by German foresters with conifer plantations.

The scientific development of forestry science started in the German territories at the beginning of the 18th century. The end of feudalism had left most of the forest in the hands of landowners who preserved them mainly for hunting. Forest management was left to the «Jäger», i. e., hunters, while the administrative aspects were in the hands of cameralists (mercantilists). A change in the relative importance of the hunters and the mercantilists occurred at the end of the 18th century, when the price of forest products started to increase and the area of forest to decrease (KIRBY & WATKINS 1998). Landowners and governments urged those in charge of the forests to develop methods to increase forest production. In France, where the great naturalists Buffon, Réaumur and Thierrat published on forestry in the first half of the 18th century, a slightly different development took place. They were followed by Duhamel du Monceau, one of the greatest foresters of the 18th century whose works revolutionized forestry. He was a forest inspector of the French navy and an excellent botanist and published several groundbreaking books on forestry between 1755 and 1767.

Forestry developed considerably in the 19th century when some German foresters, particularly Heinrich Cotta, Georg Ludwig Hartig and Johann Christian Hundeshagen, had a decisive influence on the progress of forestry management, silviculture, economics, and statistics. Different branches appeared in forestry, such as silviculture, protection, technology, management, watershed control, forest mensuration and assessment. Beginning in the mid-19th century, foresters strongly favoured the economic approach of attaining the maximum

forest revenue. In 1849, M. Faustmann published a method of calculating the maximum revenue based on an infinite series of rotations of the same duration. The new forest management aimed at the creation of pure, even-aged conifer stands in place of mixed broad-leaved stands, area regulation, a balanced distribution of age classes in the forest, a defined rotation period and strove for a maximum, constant annual yield. The need to achieve maximum economic yield favoured tree species most suited for the construction timber market and led to an industrial silviculture. The systematic introduction of the artificial regeneration of conifers, partly through afforestation made by the state for watershed management, e.g. in the Alps, was a large-scale process, in which the landscapes of several European regions were transformed entirely by reducing the amount of broad-leaved trees and the area of uneven-aged forests (AGNOLETTI 2000b, JOHANN *et al.* 2004). However, negative consequences soon became obvious, since these new pure conifer stands were not only affected by various biotic and abiotic factors, but also led to soil degradation. After high yields and returns from the first crop, subsequent crops were found to grow much more slowly in certain regions. Thus, already by 1922, the decreasing yield gave rise to modifications in forest management in Germany, e.g. the conversion of pure stands of Norway spruce into broad-leaved and mixed forests.

After the first expansion of industrial silviculture and the realization of the possible loss of site productivity due to coniferous monocultures, some foresters broke new ground. A scientific, technical and cultural change was accelerated, leading to the development of the so-called «naturalistic silviculture», which focussed on natural regeneration systems and the development of multi-species, uneven-aged stands. It was a series of French and Swiss foresters, first A. Gurnaund and later H. Biolley and H. Knuchel, who asserted the need for a radical change in forest management. The «control method» they elaborated was ideal for uneven-aged stands of mixed species. It also left more space for foresters' personal experience in deciding what was to be cut. The most important aspect was its tendency towards creating a «natural forest». It eliminated the concepts of age, rotation and maximum diameter, and calculated increment on the basis of repeated inventories. Gurnaund did not speak of the «normal forest» as the ideal to be achieved by silviculture, but rather of a «state of equilibrium» in which there is an optimal distribution of tree size classes in every compartment. However, naturalistic silviculture did not hinder the evolution of forestry towards an industrial approach.

In the 18th and 19th centuries, forest history as a discipline evolved. A book by the German STISSER (1737), and lectures on this subject held at the Forest Academy of Tharandt in 1816–

¹ This paper is partly based on AGNOLETTI, M.; DARGAVEL, J.; JOHANN, E. s. a.: History of Forestry, in: Encyclopedia of Life Support Systems EOLSS Publishers, Oxford, UK, <http://www.eolss.net> (August 30, 2006) and AGNOLETTI (in press).

18 are early evidence of this evolution. Further publications, such as those by BAUDRILLART (1824), BEHLEN (1831) and LAUROP (1843), followed. Forest and hunting history were generally treated as an introduction to other forestry-related subjects. The first important book entirely dedicated to forest history was probably published in Italy by A. Di Berenger in 1859. The author described the forest history of the Roman era and the Venetian Republic, covering everything that was considered pertinent to forestry: forest utilization, technology, silviculture, management, law, botany, physiology, pathology, and zoology. Forestry's ties to agriculture, livestock raising, hunting and parks were also included, as well as a chapter dedicated entirely to shipbuilding.

There is an interesting parallel between the development of forest history, the work of Di Berenger and the activity of a much more famous author: George Perkins Marsh. In his influential book «Man and nature», published in 1864, Marsh argued for the conservation of forests. Consequently, he has been considered the «Prophet of conservation» and the founding father of environmental history – a scientific approach that developed only in the last decade of the 20th century. «Man and nature» was widely read and discussed not only in the United States, but also in Canada, Australia, New Zealand, Europe and Italy, where Marsh participated in the debate surrounding the first forest law in 1877. His ideals were promoted in North America by the American Forestry Association, formed in 1875, by British imperial foresters visiting Australia and New Zealand, and through imperial and other international networks of correspondence. Marsh spent almost twenty years in Italy as a Minister of the US; he died in 1882 in Vallombrosa – the place, where the first Italian school of forestry had been founded in 1869. The first director of the school was Adolf Di Berenger, an «esteemed friend» of Marsh (LOWENTHAL 2000). Berenger's book on forest history was published only a few years before «Man and nature» although presenting a different view of the relationships between man and forest and remaining almost unknown outside Italy.

2. From the economic approach to imperial forestry

The ideas of modern forestry were distributed all over the world during the 19th century by diffusion of its concepts and facilitated through the structures of the European imperial powers. Forestry education was most highly developed in German universities and it was German foresters, as well as German scientists in many other disciplines, who were subsequently engaged to implement modern forestry in many countries. In addition, students from different countries were sent to Germany and France to study forestry. As other countries gradually set up their own professional forestry education, they drew heavily on translations of German textbooks or the presentation of their ideas. For example, Sir William Schlich's five-volume «Manual of Forestry» (SCHLICH 1889–1906), which contained translations of earlier German texts, became the standard work throughout the British Empire. The rise of modern forestry in the colonies of the imperial powers had the purposes of exercising territorial control and of acquiring wealth by exploiting the colonial resources and indigenous people.

Distinct strands of environmental concern and of exploitation can be seen in the origins of imperial forestry. The environmental impacts of colonization in many parts of the tropical world, caused by clearing forests for sugar and other crops, and by unrestricted logging of prime timbers, such as teak, for export, became apparent during the 18th and early 19th cen-

turies (GROVE *et al.* 1998). The major step in developing imperial forestry was taken in 1865 when a Forest Law covering most of British India was passed, a Forest Department was set up and several German foresters were appointed as Inspector-General of Forests. Other Germans, B. Ribbentrop and W. Schlich, succeeded; the Department was enlarged and legislation strengthened in 1878. The key elements of the imperial forestry model were:

- 1) locating the best types of forest suited for commercial production of timber;
- 2) declaring them as state forests and demarcating their boundaries;
- 3) eliminating or limiting any customary rights in these forests;
- 4) guarding them against incursion or unauthorized use, and protecting them from any other risks;
- 5) recruiting and training a cadre of British forest officers and a subordinate local staff;
- 6) managing the forests to meet the timber demands and generate revenue for the government;
- 7) preparing formal long-term management plans.

This model was applied in many parts of the world. In areas short of natural forest resources, state plantations were established, notably in South America, but also in places such as Trinidad and Tobago. Whereas imperial forestry was well established in India and the larger and older colonies, it remained negligible in many of the smaller and economically less important colonies. The major European imperial powers created forest bureaucracies within their colonial administrations, some mainly concerned with the provision and control of various logging concessions, others with a forestry component. Local people in many countries resisted the imposition of the imperial model of forestry. Protests started as early as in 1884 in southern India and led to a civil disobedience campaign, or *satyagraha*, in 1930. The forestry model, however, was maintained after India's independence and continued to attract opposition such as that of the Chipko movement in northern India during the 1970s against the logging of mountain pine forests.

The United States of America, Canada, Australia and New Zealand, largely followed the imperial forestry model, although by the decision of their settler governments rather than by imperial edict. In the United States, a Division of Forestry was established within the Department of Agriculture in 1881, and the first major forestry legislation, the «Organic Act», was passed in 1897. The Division became a Bureau and later, in 1905, the US Forest Service (BARLOWE 1983). Forest reserves, later called National Forests, were demarcated across the country and a program promoted the systematic establishment of modern forestry. The first professional forester in North America was a German, Bernhard Eduard Fernow, who was considered to be the leading forester from 1876 until his death in 1923 (RODGERS 1991). Carl Schenck, also a German forester, established the first forestry school in the USA in 1898. Most notable, was the large-scale organization and technical development of logging, particularly on the West Coast (FICKEN 1987), although no silvicultural treatment was applied for the management of those forest after harvesting.

Canada was closely associated with the practical approach of the American forestry and took part in the technical advances made in large-scale logging. It established three forestry schools between 1907 and 1910 to train its own foresters. However, Canada took a provincial rather than a national approach to forestry and the provincial governments played a less directly operational role. Extensive concessions were

granted to large timber corporations, which did not only build mills and mill-towns, but also constructed many forest roads. Similar to the situation in Canada, Australian forestry developed on a federal model in which the separate States were responsible for forestry. In 1875, South Australia, which had few natural forest resources, set up a Woods and Forests Department, which successfully established extensive plantations, mostly of radiata pine (*Pinus radiata* D. Don). New Zealand had native forest resources of kauri (*Agathis australis* (D. Don) Loudon) and other species that supported the initial timber industry, but these species are remarkably slow growing. A large and very successful radiata pine plantation estate was created by the State Forest Service, formed in 1921/22, and by private investments. The estate not only provided domestic supply but also expanded from the 1960s onwards to support a large timber export.

Japan's forest history deserves particular attention considering its leading position today in the world timber trade and the resulting consequences in the Asian-Pacific region. Forests have provided timber, wood, and other forest products for centuries and still cover two-thirds of this mountainous country. In pre-industrial Japan, periods of increasing exploitation and predation (TOTMAN 1998), regional shortages, erosion, and silting were countered by conservation measures. In the 19th century, Japan's industrial development relied heavily on its forests for energy as well as for construction. Towards the end of the 19th century, national and imperial forests were created, a forest service established, protection forests reserved, and planting accelerated to a peak of 150 000 hectares a year in 1910.

The first half of the 20th century was important also for the development of forest history. The growing interest in this discipline and the importance given to the historical approach in German forestry, led to the foundation of an Institute of Forest History in the Forestry Faculty at the University of Freiburg in 1943, directed by the forester Kurt Mantel. Historians and foresters surely played an important role in the development of forest history studies; however, the literature of this period reveals that the main interest was in institutional aspects, such as the history of forest laws and the history of forestry itself, while little effort was devoted to critical analyses of human-nature relationships. The years after World War II marked important changes, with the attempt to develop a conceptual framework for forest history and the establishment of international research activities. VON HORNSTEIN (1951) assessed the theory and practice of forest history, clarifying concepts such as «Forstgeschichte» and «Waldgeschichte». According to his definitions, Forstgeschichte encompasses the history of forestry, whereas Waldgeschichte addresses the history of the human-nature relationship. The latter consisted of a methodical treatment of the relationship between ecological evolution and human action. However, despite this reference to ecology – and until recently – most forest history studies did not take adequate account of vegetation changes (AGNOLETTI 2000a, b).

The growing interest in forest resources in Europe was also triggered by the historical approach of the French school of *Les Annales* in the 1930s and the work of economic historians such as Marc Bloch and Lucien Fèvre. A few historical publications on forest history, such as that of REUSS (1938), were also published in France in the same period. In the United States, interest in the economic role of the forest stimulated attention to forest history, leading to the foundation of the Forest History Society in 1946, originally established as the Forest Products History Foundation, under the Minnesota Historical Society. The circumstances of the creation of the Forest History Society are reflected in the focus of many forest history studies in the US.

3. Forestry after the Second World War

During the 1950s, 1960s and 1970s, forestry was influenced by the rapid growth of the world's population and economy, by decolonization and by new ideas of stimulating development through targeted investment. More timber was required for post-war reconstruction and for shelter, and the demand for pulpwood increased rapidly to meet the surging consumption of paper and paperboard, particularly in developed countries. Production of roundwood increased by 75 percent during this period and demand for fuelwood, particularly in developing countries with rapidly increasing populations, rose to about 45 percent of the world's total wood production.

Decolonization altered the institutional structure of forestry in the newly independent countries to only a limited extent, as the imperial forestry model was continued. Forestry departments in developing countries were affiliated to universities, while the establishment of the United Nations' Food and Agriculture Organization (FAO), which opened its Forests and Forest Products Division in 1947, considerably increased the international institutional structure of forestry. Other UN agencies took an interest in the forest sector as part of their general mandates. For example, the United Nations Development Program (UNDP) and the regional Economic Commissions encouraged the development of forest industries.

Developing countries considered their forests potential resources to provide/generate the capital they needed for modernization. The FAO and other UN agencies assisted developing countries and their forest management agencies to deal with the severity of the problems they faced, also demonstrating how the prevalent ideas of economic development could be applied to the forestry sector. The forest industries had significant forward and backward linkages through which it was thought that benefits from their economic activity would permeate, or «trickle down» to society through «multiplier effects». Thus, the investment of capital in forestry projects by aid agencies could stimulate general economic development and alleviate poverty. Many of the large-scale industrial projects that were developed were export-oriented.

During this period, the international patterns of industrial production, trade and forest use changed markedly. Wood production was increased by establishing fast-growing plantations and by opening up forests that hitherto had been used only for small-scale wood production. Large areas of tropical forests in the countries of Southeast Asia, the Pacific, and South America were cut and their products exported to Europe and North-East Asia, often increasing the already existing deforestation for agricultural purposes (COLBY 1995). The trade profile was generally characterized by the export of raw or semi-processed products from developing countries to developed countries where they were further processed.

In many European countries and in Japan, fossil fuel, such as oil and natural gas, replaced wood for heating and cooking, causing a dramatic fall in the demand for fuelwood and charcoal, and consequently reducing the use of large areas of European coppice woods especially established for fuelwood production. Large timber-, pulp- and paper-, and board mills built in Scandinavia and North America started to dominate the forest products trade. The efficiency of forest operations was increased by mechanization replacing more labour-intensive harvesting methods. However, these changes were not universal as mechanical harvesting is only efficient on slopes of less than around 15°. Mountainous regions, such as the European Alps, small-scale producers in countries with few forests suited for high quality timber, or with high logging and transport costs, could not compete. As a result, many developed countries reduced forest use but increased imports. The

decline of the forest was accompanied by a simultaneous decline in small-scale rural agricultural production, which contributed to a gradual increase in the area of forests in developed countries in contrast to the accelerating deforestation in developing countries. In the US and Scandinavia, the frontier of forest exploitation was extended into previously inaccessible forests. The extent was thus greatly reduced of what was later to be categorized and valued as wilderness.

The advance of industrial forestry in developing countries caused several problems. In many regions the use of the forest by forest-dwellers or local people was governed by traditional rights and practices. Here, the rapid extension of logging for burgeoning export markets caused considerable social disruption. The dry tropical forests were also under pressure to supply fuelwood for increasing populations. At the same time, deforestation was proceeding rapidly in all types of forest. Forest industrialization meant that the forests had to be made available for large-scale exploitation. Many countries strengthened or extended the state's control over the forests, diminishing or extinguishing indigenous community rights, a process that had already taken place in Europe was now spreading in developing countries. Many traditional forms of forest utilization were banned, as they were considered to be harmful or disadvantageous (SCHULER 1997).

Although local industrial development was often promised in concession agreements, contractors frequently sought to export the wood, either as logs, or, with very limited processing, as woodchips or rough-sawn timber. On customary lands, companies negotiated with traditional owners for rights to utilize their resources. Only few countries were successful in claiming the various royalties, license fees, land rents or harvest taxes commensurate with the value of the large mature forests they sold. The forest services were often unable to control the operations of logging contractors on public land or adequately supervise them on traditional lands. Corruption and ineffective control meant that forestry control usually existed on paper only. Often, private logging companies not only cleared natural forest, but also replaced multi-crop tribal and peasant land with mono-crop export plantations run by private property regimes (TUCKER 2000). Such plantations often destroyed traditional cultural landscapes and largely impeded any development of local populations by excluding people from their utilization.

The increasing economic importance of forests after World War II also left its traces in forest history. Forests were primarily seen as an economic commodity and sparse regard was paid to the forest dynamics that earlier botanists had studied and made evident. In the Anglo-Saxon tradition, the publication of the first volume of the «Cambridge Economic History» and books like «Forests and French sea power» by BAMFORD (1956) are good illustrations of this approach. In France it is also reflected in the articles presented in a special issue of the *Revue forestière française*, entirely dedicated to forest history, published in 1962. The publication was encouraged by the Faculty of Literature of the University of Nancy, where historians such as M. Devèze and M.J. Schneider carried out investigations on forest history, and a course of studies on the subject was established.

4. From social forestry to sustainable forest management

International forestry organizations recognized that the imperial and other forms of forestry had frequently failed in many developing countries both on their own terms and in supplying the needs of local people. The oil crisis and the Sub-

Saharan drought in the 1970s drew attention to the connections between poverty, fuelwood, and deforestation. Moreover, it became increasingly difficult – sometimes impossible – to protect the boundaries of state forests against the increasing local population's demand for wood.

A new model, «Forestry for Local Community Development», was launched by the FAO with the aim of improving the position of rural dwellers, involving them in the decision-making processes of forestry projects that would benefit them directly (HOBLEY 1996). The World Bank, the Swedish International Development Administration, as well as aid agencies supported community forestry projects around the world with the aim of encouraging villages to establish their own woodlots. The movement expanded rapidly, particularly in India and Nepal, and diversified into different regimes of property rights and relations between local people and the state. A key issue was to increase the participation of local people and diminish that of state forestry departments, which were often reluctant to relinquish control.

Social forestry was first developed as an extension program which encouraged villagers to cultivate any land not being intensively used, such as some village grazing land, worthless pieces of state land, or roadsides. Forestry departments provided free seedlings and advice; the villagers participated to some extent and the revenues had to be shared. The term Social Forestry gradually took on a broader meaning as new forms evolved, such as community forestry or joint forest management. The latter refers to an arrangement whereby villagers and the state forest service jointly manage parts of state forests and products, responsibilities and control are shared.

Social forestry has however been compromised by a lack of interest in traditional knowledge in local farmers' use of trees, as well as about their management, the farmers' perception and appreciation of trees and the various tree products and their needs and production objectives. Consequently, programs for the increase of tree resources failed, and some farmers who initially adopted tree growing on a substantial scale abandoned it after a single production cycle (ARNOLD & DEWEES 1995). Only recently has the FAO launched a program called «Globally important Ingenious Agricultural Heritage Systems (GIAHS)» defined as «Remarkable Land Use Systems and Landscapes which are rich in biological diversity evolving from the ingenious and dynamic adaptation of a community/population to its environment and the needs and aspirations for sustainable development». This has probably opened the door for a wider recognition of the crucial role of traditional knowledge for biodiversity, for the cultural identity of local communities, and for the natural and cultural heritage of the world.

5. Sustainable forest management

Modern forestry, like other sectors, was challenged in the 1970s by an increasing global awareness of and concern for the environment. The environmental movement launched a savage critique of the forestry profession and its institutions in many countries. The movement's primary concern was the loss of habitat for wildlife, caused by the replacement of old-growth forests by younger stands, or by plantations of single species. Further concerns followed regarding soil erosion, water quantity and quality, loss of recreational amenities. The movement questioned the economics of forestry, criticized the lack of internalizing environmental costs, and it alleged that state forestry provided concealed subsidies to forest industries.

The practice of clear-cutting became a focus of criticism, particularly in North America and countries like Australia where it was practiced on a large scale. In such countries forestry was portrayed by the media as being the unacceptable face of the economic interests of large forest companies. In developing countries, it was portrayed as ineffectual and misguided, or as the corrupted face of the international timber trade. The critique was accompanied by calls for large areas to be assigned National Park or special conservation reserve status, banning logging and other forms of exploitation. Forestry organizations and professions defended their management referring to their protection efforts against agricultural incursion and deforestation as the original forms of conservation. Forest officials also emphasized the multiple values inherent in forests and claimed that forests either were – or could be – managed to account for all these values (SEKOT 1997). However, forestry organizations started efforts to reduce the environmental impact of their operations by specifying them in various enforced codes of forest practice.

Multiple use forestry became the prevailing idea of forestry worldwide, and was recognized in the legislation and policy statements of most countries. Mapping systems and codes of practice were developed to implement it. Environmental economists examined the relative economic value of various uses, such as timber production and recreation. However, they were unable to account for all forest values, which led to a specification procedure determined by the conditions of the particular forest patches and subjective judgment. Foresters and governments readily accepted the concept of multiple use forestry because it reformed, rather than radically changed the basis of modern forestry. It facilitated the continuation of logging in the face of environmental criticism, and hence did not attract significant opposition from industry. Moreover, it saved and technically enhanced the status of the state forest services and the forestry profession.

The international development of forestry and the growing importance of forest resources were also reflected by forest history. In 1963, the growing collaboration among scientists of different countries led to the foundation of a research group within IUFRO, dedicated to forest history. This was a clear recognition of the importance of the historical approach in forestry and the beginning of international co-operation on the subject. A distinction between a history of forests influenced by humans and a history of «natural» forests not influenced by humans was postulated. The development of ecological studies and the work of botanists implied the existence of a history of a vegetation form not related to human influence, which was not receiving much attention from forest historians, at least not in the German approach.

A clear view of the main trends in forest history was offered by the first international conference organized in Nancy in 1979, where forest policy, history of forest changes, forest techniques and ecological aspects were discussed, indicating a change in the traditional interests of forest historians (SCHULER 1982). The Nancy conference was followed in 1981 by the foundation of the «Groupe d'Histoire des Forêts Françaises», and in the same year new working groups were established within the IUFRO Forest History Group, the first of them on tropical forest history. It organized a conference on Asia, Oceania and Australasia under the auspices of The Australian National University, and another on Latin America under the auspices of the American Forest History Society. (STEEN & TUCKER 1992). The issue of sustained yield was treated in a meeting organized in Portland (OR-USA) in 1983, demonstrating the interest in a historical perspective for what was a dominant aspect of forestry at that time. The second new IUFRO group was created in 1986 and was dedicated to the history of the

timber trade and timber industry, a discipline that had already entered the curriculum at the University of Forestry in Sopron (Hungary) in 1978. In this respect the meeting organized by Toni Schuler in Zurich, in 1984, entitled «History of forest utilization and forestry in mountain regions» touched upon the fundamental issue of exploitation of forest in areas crucial to the fulfilment of many forest functions, ranging from protection to production (SCHULER 1985) a subject that Schuler has actually continued to develop up to recent times, connecting it to the latest advancements in forest history studies (BÜRGI & SCHULER 2002).

The 1970s and 1980s marked a significant development in environmental studies, determining a change in the approach to forest history. One important event affecting not only forest history studies, but generally the way investigators perceived ecological changes, was probably the publication of the book «Trees and woodland in the British landscape» by the botanist RACKHAM (1976). His approach, combining woodland ecology and historical evidence, and based on the understanding of traditional practices in shaping landscape, suggested that investigators use a new method, integrating traditional written sources and material evidence in order to understand forest changes, but also stimulating a growing attention to human influence and cultural landscapes. The importance of Rackham's work was soon recognized by forest historians as demonstrated by the Nancy conference where he presented a paper on the medieval woods in England. From a general point of view the new achievements in ecological studies, especially in the field of structures, functions and dynamics of forest ecosystem (BORMANN & LIKENS 1979), slowly moved the scope of investigations towards an increasing consideration of forest changes. Nevertheless, ecologists' awareness of the role of man as a key factor in the evolution of forest ecosystems was still limited. In fact, with few exceptions (TUBBS 1968) most of the ecological studies have always concentrated on climate and soil, as the main factors affecting vegetation changes.

6. Forestry and environmental concern

The interest of forest history in ecological aspects reflected a worldwide tendency. Concerns about the deteriorating condition of the world's environment continued to deepen during the 1980s. Deforestation in the tropics was the most serious concern; however the initial worries that had given rise to the concept of multiple use forestry could not be eliminated by its practice. New concerns arose over the effects of airborne pollution on the forests of industrial countries, the possible loss of species in many parts of the world, and the accelerating loss of vegetation cover across the dry woodlands and savannas in Africa. Notably, wider and international concerns started to influence forestry's traditionally provincial and national policies.

It was estimated that during the 1980s, tropical forests were being deforested at a rate of approximately 11 million hectares a year of which 7.5 million were in the closed forests and 3.8 million were in the drier open forests. The world's largest tropical moist forest in the Amazon was being opened up rapidly for cattle ranching, sawmilling and large-scale exploitations, like the remarkable Jari project that established extensive plantations for an export-oriented pulp mill. The disastrous impacts on the indigenous forest-dwelling tribes attracted international attention. At the same time, in states further south in Brazil, the government provided generous tax concessions to companies that established extensive industrial plantations to supply wood to the paper pulp and steel indus-

tries. In this case, it was the peasants and small farmers, who were displaced. The rapid expansion of the Japanese log export trade had drastic effects on the forests of South-East Asia and the Pacific Island countries. The environmental criticism of forest management in both the tropics and the developed countries became more firmly rooted in ecology, as forest systems became better understood. The scope of concern was extended to include certain endangered species and the full biological diversity, or «biodiversity», of the forest. This presented a significant challenge to multiple use forestry that had been able to adapt to the requirements of particular species with measures for particular patches.

The greater interest in ecology slowly moved the objectives of forest history towards closer attention to the effect of human influence on forest vegetation changes, gathering the interest of a large number of scholars, coming from the natural and social sciences. Greater consideration of the ecological approach was also stressed by Rubner in 1986, one of the founders of the IUFRO research group on forest history. This growing importance of the ecological approach was officially ratified by some changes in the structure of the IUFRO group when a new working group on ecological history (originating from a project of the European Science Foundation on forest ecosystems) joined it in 1995. The presence of the new group strongly reinforced the relations with ecology and more generally with the scientists involved in natural sciences, but it has also imposed a different organization on the group in order to reflect and balance all represented perspectives. The occasion for this rearrangement was given by the Florence conference in 1998, where the former working group title «History of timber trade and timber industry» was changed to «Economic and social history of the forest». The new working group recognizes the relevance of many different economic and social factors affecting forest changes, not simply those related to the main economic issues, but also to small-scale processes, related to local uses and practices, and to cultural aspects.

The concern for the state of the environment was supported by a number of initiatives that arose in the 1970s. In 1972, the United Nations Conference on the Human Environment took place in Stockholm. The final document affirmed that: «Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations». In this framework «the natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate». Later on, in 1987, the report of the Brundtland Commission highlighted the tension between economic growth and environmental protection; it concluded that while economic growth was essential, it was only environmentally bearable when it was directed to a «sustainable development». It was also declared: «States shall maintain ecosystems and ecological processes essential for the functioning of the biosphere, shall preserve biological diversity, and shall observe the principle of optimum sustainable yield in the use of living natural resources and ecosystems». The UNCED conference in Rio de Janeiro in 1992 took a further step in this direction, declaring its Agenda 21 and agreeing on a set of Forest Principles. Although the statement of the Forest Principles does not amount to a binding international agreement, it reflects a serious resolution that forests should be managed sustainably. Many other meetings, a range of multilateral processes and a plethora of documents at international, regional and national levels reflected the resolution of the Rio

Conference. Subsequent multilateral processes have a variety of forms and are directed to particular regions or types of forest. They attempted to clarify sustainable forest management and explain how it could be applied in different parts of the world, but they also promoted forest certification standards that are applied in several parts of the world today (UPTON & BASS 1995). Salient ones are:

- International Tropical Timber Agreement (1983) with its organization, the International Timber Organization (ITTO);
- Helsinki Process (Ministerial Conference on the Protection of Forests in Europe, MCPFE 1990);
- Montreal Process (1993);
- Dry-zone Africa Process (1995);
- Tarapoto Proposal for the Amazonian Forest (1995);
- Near East Process (1996);
- Central American Process of Lepaterique (1997).

The ITTO was formed in 1983 by an international agreement between the producing and the consuming countries with a non-binding goal that by 2000 all timber traded between member countries should come from sustainably managed forests. Its 56 member countries represent 95 per cent of world trade in tropical timber. ITTO developed sets of guidelines and recommended actions to be taken. Its Bali Partnership Fund was set up with funds from Japan and other consumers to help producing countries build up their institutional capacity.

The Montreal Process was started in 1993 to consider environmentally sustainable management in the temperate and boreal forests. The European countries continued with their Helsinki Process, while a group of 12 countries, including Australia, Canada, Japan, Russia, and the United States, concentrated on developing scientifically based criteria and indicators with which to measure the progress towards sustainable forest management.

The MCPFE, Helsinki or Pan-European Process was launched in 1990 as a high-level political structure for co-operation. It involves around 40 European countries and has the purpose of addressing common opportunities and threats related to forests and forestry. Four Ministerial Conferences have taken place (1990 Strasbourg, 1993 Helsinki, 1998 Lisbon, Vienna 2003). Between the Conferences, the signatory states and the European Community are responsible for implementing the voluntary commitments to a working program. The process is intended to further the long-term objectives of sustainable forest management and the sustainable development of society. It is arranged in 6 main criteria:

- 1) Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles;
- 2) Maintenance of forest ecosystem health and vitality;
- 3) Maintenance and encouragement of productive functions of forests;
- 4) Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems;
- 5) Maintenance and appropriate enhancement of protective functions in forest management;
- 6) Maintenance of other socioeconomic functions.

Forest certification standards have been developed from these criteria, such as FSC, FSI, and PEFC. However, these standards are still not very effective, or encounter numerous difficulties in their practical application (FERGUSON 1996). For sure, the one for Europe (PEFC) derived from MCPFE, is also criticized today for its lack of consideration of cultural values – in itself an important reflection on the way sustainability is perceived and applied

7. Cultural values, forest history, sustainable forest management

The criteria of MCPFE, like those of other forest processes, represent a sort of hierarchy of values for the management of forests and woodlands. Looking through the various chapters we find only occasional references to cultural values. Chapter 6.11 states: «Number of sites within forest and other wooded land designated as having cultural or spiritual values», suggesting that sites with evidences of cultural values could be preserved. The fact that cultural values play such a limited role indicates the little consideration given to the role of culture and history in the overall value of the forest territory, according to a widespread paradigm of sustainability developed in the last decades. This paradigm emphasises the negative role of man in the environment, as an agent depleting the ideal state of «naturalness», which is considered the most desirable for the life of organisms and the overall quality of the biosphere. The degradation of the environment is undoubtedly a reality and a threat that affects the world. However, several investigations carried out in the fields of forest and woodland history and historical ecology (today generally included into the wider framework of environmental history) indicate a wide number of cases where man has created valuable landscapes, not only from a cultural but also from an ecological point of view, which enhance overall diversity and improve the conditions of the environment.

The relevance of cultural, historical and landscape values in European forests could well represent one discrete criteria for sustainable forest management. For sure, recognizing the cultural origin of the European forests can hardly be reduced to the matter of saving some particular sites, but should rather acknowledge the cultural values of all European forests and find a way of managing them according also to this perspective. The MCPFE recently opened up reflection on this issue by highlighting an initiative started by the Austrian government during the Vienna conference of 2003. The Vienna meeting produced the declaration no. 3, addressing the need for the conservation of cultural values in sustainable forest management, although there is still much to do at European level.

Unfortunately, the role of culture is not really addressed in the recent Vision and Strategies of the new EU Forest Action Plan. Neither is any mention made in the report of the policies developed so far, either in forestry or agriculture (PAC), which have facilitated the degradation of the cultural values of European landscape. The environmental objectives set out in the report are a mere reiteration of attention to nature and biodiversity that will probably result in favouring renaturalization, the further extension of homogeneous forest covers, and the strong reduction of the residual landscape diversity originated by cultural influences. These strategies, however, are also a result of the general approach to environmental conservation developed in the last 30 years, as explained in the previous chapter. The European union has actually achieved a very important objective establishing a network of protected areas for the management of Europe's natural heritage (Nature 2000), but little has been done to protect cultural heritage, or to recognize the cultural origin of a large part of the European forest landscape. This creates many contradictions in the management of these areas. The principles and the selection of habitats on which they are based clearly focus on natural «species» and not on the diversity of «spaces» or «species» fostered by specific land use systems. Therefore, not only fragmentation which is typical of many historical landscape mosaics, but also the human

impact, which is needed to preserve these areas, can be seen as potentially dangerous, or even forbidden.

In this respect several historical investigations carried out over the past few years support a different perspective, aimed at a better consideration of the action of the man, also for biodiversity, and the need for the inclusion of cultural values in SFM. A recent study carried out to develop a monitoring system of landscape quality in Tuscany (Italy) has shown that landscape diversity due to historical land uses (including many forest structures) decreased dramatically over the last 200 years (45 %) due to the extension of forests on abandoned fields, reaching even 86 % in a study area inside the Apuane Park in the Apennine range (AGNOLETTI 2004, AGNOLETTI in press). The problem that the extension of forest land is reducing the fragmentation of landscape mosaic has already been recognized in North America (FOSTER *et al.* 1998). To counteract this problem new guidelines have been developed for the conservation of landscape resources in the protected areas of Tuscany, where historical investigation plays a fundamental role as a methodology to monitor and manage landscape changes, recognizing also the existence of many different forms of forest landscapes shaped by human influence and little need for the further extension of homogeneous forest covers.

The assessment of cultural values is actually a new trend in forest history research, as shown by some meetings organized by the Iufro group on Forest and Woodland History. Noteworthy are those held in Florence (2002), dedicated to the analysis and conservation of cultural landscapes, and in Vienna (2004), which focused entirely on the cultural value of European Forests. In this respect the Iufro research group is presently committed to elaborating a revision of the criteria and indicators in SFM, developed by the Ministerial Conference for the Protection of Forest in Europe according to the process started by the Vienna conference in 2003 and continued in the MCPFE meeting held in Sunne (Sweden) in 2005. In June 2006 a new international meeting was organized in Florence by the Iufro Research Group on Forest History, the IUFRO Task Force on Traditional Forest Knowledge, the MCPFE and the Italian Ministry for Agriculture and Forestry. The meeting was attended by the representatives of the United Nations Forest Forum, FAO, the DG Research of the European Commission, the European Landscape Convention, and the World Heritage Centre of UNESCO, confirming wide interest in this matter. The meeting clearly reported the gradual disappearance of cultural values in the European landscape and in many other parts of the world, as well as the need for a consistent strategy to assess these values. One very positive result of the meeting was the decision of Iufro and MCPFE to establish an expert group that will produce guidelines and new indicators for the implementation of cultural, historical and landscape values in SFM at European Level.

8. Conclusions and outlook

Forestry has seen important developments, passing from an approach mostly based on production to a closer attention to ecology and nature conservation. These developments are well represented today in the criteria and indicators of Sustainable Forest Management developed in numerous processes all over the world since 1992. However, these criteria have neglected the role of culture and history in shaping forest landscapes, up to the point that cultural landscapes are often more endangered than nature, especially in Europe. The recent development of historical investigations have led to the recognition that modern approaches to Sus-

tainable Forest Management cannot be developed without understanding the significance and the role of culture in shaping today's forests because a significant proportion of the world's forests are still managed by local and indigenous cultural traditions. Culture has greatly contributed – and continues to contribute – to the world's natural and cultural heritage, not only by creating and maintaining landscapes with outstanding aesthetic beauty, but also by helping to sustain production of multiple goods and services which provide livelihoods, security and quality of life. However, the conservation of cultural values and the landscape they created often imposes difficult choices, along with the revision of some past orientations, developing a more comprehensive approach to sustainability. In this respect, forest and woodland history plays an important role, showing the ability not only to undertake a critical analysis of past policies, but also to investigate environmental changes, supporting management strategies, advising policy makers and informing the public.

Summary

From the middle of the 19th century forestry strongly favoured the economic approach of attaining the maximum forest rent, an approach that was extended to most of the world under the framework of the «imperial forestry» model. Forest history in this period dealt primarily with the history of forestry and economic aspects. Forestry was changed during the 1950s, 1960s, and 1970s, by the rapid growth of the world's population and its economy, but was challenged by the rise of concern for the environment. In the following years forest history began to develop new approaches. The UNCED conference in Rio de Janeiro in 1992 advocated the notion of sustainable development, from which the criteria of Sustainable Forest Management are derived. These principles, however, neglected culture, history and landscape values. This problem has consequently been addressed by number of initiatives of the iufro group on forest and woodland history, supporting the need to include these values in SFM.

Résumé

L'homme, la foresterie et les paysages forestiers. Tendances et perspectives d'évolution de la recherche sur la foresterie et les forêts

Depuis le milieu du XIX^e siècle, l'accent a été mis en foresterie sur les considérations économiques et la recherche du rendement maximum. Connue sous le nom de «foresterie impériale», ce modèle s'est étendu quasiment au monde entier. Durant cette période, l'histoire forestière s'est consacrée avant tout à l'histoire de la foresterie et aux aspects économiques. La foresterie a connu ses principales modifications au cours des années 1950, 1960 et 1970 sous l'effet de la croissance rapide de la population et de l'économie mondiales, l'attention croissante portée aux préoccupations environnementales représentant un défi dans ce contexte. Durant cette période, de nouvelles approches ont également été développées dans le domaine de l'histoire forestière. La Conférence des Nations Unies sur l'environnement et le développement a préconisé, en 1992 à Rio, la notion de développement durable dont sont issus les critères de la gestion durable des forêts qui, cependant, négligent les valeurs culturelles, historiques et paysagères. Le groupe iufro sur l'histoire des forêts a attiré l'attention à de multiples reprises sur ce problème en soulignant la nécessité d'intégrer ces valeurs dans la gestion durable des forêts.

Traduction: CLAUDE GASSMANN

Zusammenfassung

Mensch, Forstwirtschaft und Waldlandschaften. Trends und Perspektiven in der Entwicklung der Forstwirtschaft und Waldlandschaftsforschung

Seit Mitte des 19. Jahrhunderts begünstigte die Forstwirtschaft zunehmend die rationelle Methode, um aus dem Wald ein Maximum an Ertrag zu erzielen, und weitete sie im Rahmen des Modells «kaiserlicher Forstwirtschaft» beinahe über die ganze Welt aus. In diesem Zeitraum beschäftigte sich Forstgeschichte vorwiegend mit der Geschichte der Forstwirtschaft und mit wirtschaftlichen Aspekten. Verändert wurde die Forstwirtschaft mehrheitlich in den 1950er, 1960er und 1970er Jahren durch das starke Wachstum der Erdbevölkerung und deren Wirtschaft, wurde aber durch die Zunahme der Belange der Umwelt herausgefordert. So entwickelte auch Forstgeschichte in diesen Jahren neue Herangehensweisen. Die Konferenz der Vereinten Nationen über Umwelt und Entwicklung in Rio 1992 befürwortete den Begriff der nachhaltigen Entwicklung, von dem die Kriterien eines nachhaltigen Waldmanagements abgeleitet wurden. Diese Grundsätze vernachlässigen jedoch kulturelle, historische und landschaftliche Werte. Auf dieses Problem machte die Iufro-Gruppe «Wald- und Forstgeschichte» wiederholt aufmerksam, indem sie die Notwendigkeit betonte, diese Werte in ein nachhaltiges Waldmanagement zu integrieren.

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