

National Report of the Federal Republic of Germany for the Joint FAO/ECE/ILO Committee on Forest Technology, Management and Training

Subject area 1.. Management (silviculture, multiple use forestry, ecological and economic issues, marketing, information systems)

a) Achievements and important innovations over the past two years

1. There is still a broad consensus in German forestry about the aims of a sustainable, ecologically compatible, socially acceptable and future-oriented forest management which is also financially rewarding. The required social acceptance can only be expected in the long run if intensified public relations make the role of forestry in forest conservation and the provision of the renewable resource timber credible as an exemplary model for implementing the "Rio Earth Summit", the 1992 United Nations Conference on Environment and Development in Rio de Janeiro, and its follow-up processes.

The "1st German Forest Summit" in 2001, when the German forestry sector endeavoured to negotiate a "social contract for sustainable forest management and timber use in Germany", involving all groups of society, constituted a step in the right direction.

All well-known certification schemes aim at improving the acceptance of timber from sustainable forest management. Furthermore, they serve as a market economy instrument for forest conservation. To realize this objective, we need to place great emphasis on this common interest and not on the demarcation of different concepts, e.g. FSC or PEFC. Certification schemes focus on requirements for forest management. The requirements for forest technology have not yet been finally defined. Operational target criteria for occupational safety and health have not yet been defined. The section forest technology in the as-

(sociation of German research centres has agreed and issued a leaflet entitled "Technology in forests - serving sustainable forestry, nature and society" as an element of the module "forest technology".

2. Globalization also reaches German forestry in the "minds" of the actors, in real situations in open market outlets and in the search for optimum solutions, also drawing on the know-how and technology of other countries. The ensuing competition of products and ideas, compounded by the tense profit situation, results in a strong pressure to re-organize forest enterprises and forestry administrations or even to change the legal form of state forest enterprises (e.g. to land enterprises). The aim is to economize on administrative costs to respond more flexibly to a modified environment in terms of customers, markets and framework conditions.

3. One reply to the challenges German forestry faces due to globalization is the process orientation with optimized operations throughout from forests to factory and a thinking in terms of customers (customer-orientation). In the process, forest ownership-based solutions compete with those organized by the timber industry or service enterprises. In the forest enterprises, the customer-focused supply of timber requires a more flexible deployment of forest workers and machinery with a new structuring of operations and wider range of tasks at the executive level of businesses. The work is increasingly performed by semi-autonomous teams of forest workers with enlarged planning, management and performance-reviewing tasks. This has an impact on vocational training, further training and advanced training in forestry at all levels and is ultimately also reflected in new remuneration schemes for forest workers (monthly wages with merit bonus in some cases instead of piece-wages).

4. Electronic data processing with new information and communication technologies and the information processes are playing an ever greater role in operational processes and their control. Their networking in all fields of forestry and also with its partners (timber transportation, timber industry) is becoming increasingly close and efficient, supported by the medium internet and intranet as well as by e-mail and the widespread use of mobile telephones (radio communication does not cover all forest areas currently).

5. The year 2000 was chiefly marked by the repercussions of the storm disaster "Lothar". The storm caused an accumulation of around 34 million solid cubic metres in windfall timber, 29 million cubic metres of which in Baden-Württemberg and 4.5 million cubic metres in Bavaria. The regular fellings in Germany were limited by the application of the Forest Damage-Compensation Act in 2000 and to a lesser extent in 2001. The accumulation of

timber concentrated in South-West Germany required the mobilization of all means (train, ship and lorry) and capacities of transport to achieve a balance between the regions. In addition, ca. 4.5 million cubic metres of coniferous logs were kept in longer-term storage in wet timber preservation yards in Baden- Württemberg.

6. The "strategic" questions preoccupying German forestry are reflected in the key topics of large forestry meetings – hence they can also be seen as a mirror of what is generally regarded as a programmatic message or central problem to be solved:

- Meeting of the Council for Forest Labour and Forest Engineering (KWF) 2000: Forestry in harmony with man, nature and technology
- German Forestry Association 2001 - A forest for all cases - Sustainable forestry: future-oriented and ecologically aware.
- German Forestry Council - Forest Summit 2001: Sustainability: A contract of generations with the future
- Interforst 2002: Timber: responsibility for the future
- Meeting of the Council for Forest Labour and Forest Engineering (KWF) 2004: Process orientation in forestry – new technology, new partners, new thinking.

b) Difficulties which have arisen and measures initiated to deal with them

1. Public relations work in German forestry still requires improvement in spite of promising signs, e.g. campaigns run by the Timber Sales Promotion Fund or the First German Forest Summit.
2. The improved equipment of forest districts in terms of telecommunication and information technology (especially with PCs) is continuing. In the process, problems arise from the large capital expenditure required, inter alia, on user-friendly software as well as from the necessary training and further training of forestry personnel.

3. The increasing equipment of mechanized wood harvest systems with modern surveying and information technology facilitates operational planning and will open up new opportunities for data transfer and for optimizing cross-cutting and supply of timber and logistic chains in the future. So far, however, the existing opportunities have hardly been used (pilot projects, model enterprises notably in large private forests and in forestry groupings). The problems concerning the required "intellectual integration" of forestry, transport and forest industries will and must be increasingly thematized in the future (e.g. German Forestry Association, Interforst, KWF meetings).

4. As a result of further streamlining efforts the trend of outsourcing intensifies, i.e. a transfer of former scheduled work to existing forestry service enterprises engaged in tough competition. This development must be controlled and the service enterprises integrated into the processes as target groups and partners.

5. The highest resource potential can still be found in small private forests, a fact which jeopardizes the planning of investments into the timber industry. Mobilization campaigns based on mobilization studies are designed to improve this situation. Forest enterprises providing a full range of services from silvicultural planning to marketing can make a key contribution to mobilizing available resources.

c) Emerging priorities for Joint Committee activities

1. A professionalization and intensification of public relations is of crucial importance for a forestry sector, which is increasingly influenced by social requirements. As this applies internationally, joint coordinated activities would be desirable.

2. Timber made in Germany faces competition from timber on the world market that is not produced according to the high, stringent standards of sustainable and ecological forestry. Here, the Joint Committee could support the activities initiated as a follow-up to the Conferences of Helsinki and Rio by defining joint technical standards for sustainable, ecological forestry and forest industries.

These standards ("codes of practice") must also cover the fixing of criteria for ecologically sound forest technology (machines and their use) and their materials (e.g. chain lubricants for loss lubrication, hydraulic liquids). Yet, they must ultimately also deal with the fixing of

minimum criteria in the social field (rules for labour deployment from so-called low-wage countries, issue of "subcontractors", comparable data on industrial accidents). Too little account has so far been taken of the module "forest technology" notably in the discussion on the certification of timber. This gap should be closed by a joint coordinated approach.

3. The adjustment of technical standards resulting from EU harmonization should also be continued in the forestry sector by the drafting of international standards. Here are some examples of key fields:

- . dimensional and quality grading of roundwood,
- . record layout, structure and transfer of forestry data,
- . criteria for a comparative assessment of forest technology taking profitability, occupational safety, ergonomics and environmental conservation into account.

4. Due to the international interdependence of forestry and forest industries and in view of scarce research funds, the Joint Committee should seize every opportunity to exchange experience and to solve common problems in a coordinated, labour-dividing and intensified way, if possible.

Subject area 2: Technology (wood harvesting and transport, forest engineering, ecologically and economically sound operations in silviculture)

a) Achievements and important innovations over the past two years

1. The shaping of rational logistics plays a key role in improving the competitive situation of the forestry sector and of the raw material timber to reduce or avoid so-called transaction costs notably. The process orientation in forestry pursued for this purpose is designed to optimize the value-added chain, i.e. the process ranging from the surveying of the "warehouse" forest via wood harvesting to long-distance transport to the wood-processing industry, involving modern information technology. The focus is on a stronger customer and product orientation, which must increasingly form the basis for selecting processes and the deployment of forest technology.

The implementation of logistic chains is currently less hampered by technical arrangements and lacking means of communication than by structural obstacles (ownership patterns or lack of unions to overcome them, still unadapted organizational structures, a lack of co-operation among the types of forest ownership, too little transparence, competition is too fierce). What is required is a willingness to cooperate and a readiness to invest.

2. New mobile harvester surveying systems for a mechanized wood harvest provide through their grading optimization aided by on-board computers an opportunity to improve profits not only by cost-cutting, but also by increasing revenues. Thus, the product diversity of a stand can be used and marketed in an optimal way. Yet, the development has only started hesitantly here. A better integration of the harvester measurement as a sales measurement would be desirable to shape logistics. However, a persisting problem is that of the lack of calibration capacity so far preventing its legal use as a sales measurement. The large-scale implementation of KWF- requirements specifications in the international Organization for Standardization has now provided in standardized form the information demanded by Germany with a view to national measuring provisions. On this basis, a discussion is underway with the calibration authority on granting an exemption for mobile harvester surveying systems which would make sales according to harvester measurements lawful.

The development of contact-free or alternatively non-intervening measurement technology continues and is supplemented by Swedish developers with a quality assessment of measured wood through camera-based systems.

3. Streamlining fleet management for long-distance transport is expected of GPS (Global Positioning System) and GIS (Geographical Information System): optimization of vehicle utilization and transport routes, facilitating disposition, faster assistance and all information at "a glance". Coupled with digitized maps, GPS and GIS could play an important role in the use of harvesters and forwarders as well. In cooperation with the international organization for standardization, work is currently underway on integrating GPS data in harvester processing and skidding to clearly determine the position of timber stacks. To this effect, the "German variables 601-603" set out in the KWF requirements specifications must be enlarged. This necessitates an intensive data exchange with the manufacturers and users of such systems.

4. Today, the state-of-the-art and development of the product spectrum in forestry machinery with a view to user-friendliness, suitability for off-road use, ergonomics, occupational safety, maintenance- and service friendliness as well as ecological compatibility are at a high level. Yet, further detailed improvements are still expected.

To further improve the ecological compatibility of forestry machinery, the following measures are being developed and tested: tyre-pressure control systems to improve suitability for off-road use and soil conservation, the development of an information system with soil parameters and machine-technological parameters as input variables to assess the passability of forest soils, more eco-friendly hydraulic liquids and systems as well as a reduction of energy requirements, especially of fuel consumption related to the solid metre of wood (energy efficiency).

As an interesting engineering solution, more and more so-called multi-purpose machines have entered the market:

- Timber haulage: a combination of forwarder and cable skidder, the first of these multi-purpose machines are currently being examined.

- Mechanized wood harvest: a combination of harvester and forwarder (harwarder). In Scandinavia and North America these multi-purpose machines are believed to establish themselves as future standard machines. A market niche is thought to exist under central European conditions. Intensive studies on the operating conditions and workflows of the harwarder are required.

- The II mountain harvester" for slopes: a combination of skyline crane and processor has now proved its worth. The potential for innovation in skyline crane technology is remarkable.

. Crawler harvesters devised for 40-60% slopes have now proved their worth. Yet, the serious damage to tree roots should be viewed critically necessitating a broader strip road which is a disadvantage especially on slopes due to the greater erosion hazard.

5. The energy use of timber is steadily rising, focusing on wood-chip production with trailer chippers or mobile chippers (self-propelled machines on forwarder chassis).

b) Difficulties which have arisen and measures initiated to deal with them

1. A stepped-up process of coordination between forestry and the forest industries is required to optimize logistic chains. New sales practices and improved exchange of data (mobile forest surveying, in-plant measuring, electronic data exchange) are sound concepts to bring together market partners and build confidence. Several pilot projects on this issue are currently underway in Germany. These pilot projects are also expected to dispel still existing doubts and to solve problems which have arisen in practice.

2. Mobile surveying systems are currently only used hesitantly. A key reason for this is that these systems lack calibration capacity. Ever more sophisticated systems also hamper intuitive handling despite better user guidance. The large-scale implementation of the requirements specifications drawn up by KWF on harvester measuring in the International Organization for Standardization have now created the prerequisites for advancing the granting of an exemption for the harvester measurement with the calibration authority.

The training of users of mobile surveying systems shows serious deficits in some cases so that the potential of the machines is only exhausted to a limited degree. An improvement of the syllabi of schooling, training and further training is currently being discussed in co-operation with the training centres.

3. The prices for sophisticated forest technology meeting today's requirements are extremely high. This also applies to maintenance (notably repairs).

The development of concepts for a comprehensive maintenance management, as it is practiced by e.g. Sveagskog AB in Sweden or in the car industry, would be desirable.

4. The lack of radio communication in the analog trunked radio communication system results in the increasing use of mobile telephones in the D networks. To provide a reliable emergency system here, too, a data sheet was drafted containing distress signal devices for forestry personnel. If the radiocommunications in these networks will suffice for forestry in the future is still doubtful though.

5. The certification debate shows that the module "forest technology" and its eco-friendly use has hitherto been insufficiently assessed and considered according to internationally defined and universally recognized criteria.

c) Emerging priorities for Joint Committee activities

1. Promotion of co-operation (exchange of experience and information, data exchange) between foresters, forest owners, forestry entrepreneurs, forestry science, manufacturers of forest technology and the timber industry.

2. Guidance in the creation of improved framework conditions for the establishment of optimized logistics (e.g. surveying provisions, sales practices, promotion of the readiness to invest in equipment with modern means of communication, digitized maps and mutual coordination of systems).

3. Improvement of the coordination and communication among manufacturers of forest technology (industry) and users of forest technology with a view to a common design of technologies.

4. Clarification and improvement of framework conditions making the purchase and use of forest technology, which has been tested for environmental soundness, ergonomics and occupational safety (e.g. FP A), attractive and economically viable.

5. Creation of framework conditions to improve the knowledge of forest technology at the responsible planning levels, to improve the bases for planning for large processing units as well as for a co-operation encompassing several enterprises and forest ownerships.

6. Creation of framework conditions for a supra-enterprise machine information system and maintenance management, conceivable also at an international level, aimed at pooling information for forest machinery, of which relatively few units are available. What is expected, for example, is a cut in maintenance costs and a speedier and more targeted implementation, e.g. of technical modifications by industry.

7. The expected nationwide use of digital radiocommunication for authorities and organizations entrusted with safety tasks (BaS) under the TETRA- and Tetrapol-standards respectively would provide radiocommunication sufficing for forestry as well. The integration of forestry in this user group or in an equivalent user group is a priority task requiring broad support from outside - if possible, also political support.

1. Subject area 3: Training (of workers, supervisors and managers, applied ergonomics and occupational safety and health)

a) Achievements and important innovations over the past two years

1. The rapid structural changes in forestry have implications for training, further education and advanced training in forestry. At all forest management levels the job descriptions are no longer geared solely to the personnel requirements of traditional forestry. The traditional training syllabi are being expanded towards subsequent activities in the fields of forestry services, in nature and environmental conservation and management etc.

Apart from technical competence, the conveying of methodological and social competence is increasingly gaining in importance at all levels of training.

. Forest workers: The number of forest workers is subject to further cuts in all *Laender*. While the number of apprenticeships to become a forester is stagnating at a relatively high level, the availability of traineeships in private forest ownership is receding.

The work concept of semi-autonomous teamwork is being applied or tested further in four *Laender* and has now also been expanded to mechanized timber harvest in Thuringia.

- . Under the changed framework conditions, the further training of foresters carries more weight. Therefore, further training is to be increasingly systematized and controlled and be more focused on target groups.
- . Further training to become a master forester: due to the reorientation in the forester field, the Ordinance on the Further Training to become a Master Forester is the current aim which is being discussed by management and labour.
- . Training and further training to become a forest machine operator: In the Land of Brandenburg, an Ordinance on the Further Training of Foresters to become State Certified Forest Machine Operators has been adopted. It is being tested in a pilot project if and how particularly skilled trainees can undergo advanced training to become state certified machine operators during the regular training period. There are opportunities for further training to become a forest machine operator in three other Länder. The question as to the financability of further training arises upon the completion of the training schemes.
- . Graduate Forest Engineer (technical college): The training situation is marked by the drastic decline in demand for graduate engineers in the traditional job description of a forest ranger, particularly in public forest administrations. The technical colleges are enlarging their educational opportunities.
- . Graduate Foresters (University): The university colleges also record a steep decline in the demand for graduates. All Forestry Colleges are implementing reform concepts, aimed at enlarging the job description towards landscape management, forest industries, environmental management, planning of green areas and development aid. All four German Forestry Colleges now offer Master degree courses and it is possible to take a Bachelor degree at the Dresden Technical college in Tharandt.
- . Forestry entrepreneurs and their staff: The currently provided educational opportunities by vocational schools for forest workers are only hesitantly accepted by forestry entrepreneurs. Reasons for the poor uptake of educational opportunities are of a structural nature (seasonal nature of orders, lack of rewards on the market, competition, price and wage dumping), but also a lack of willingness on the part of the entrepreneurs to help finance training schemes.

. The educational opportunities for owners of small Private forests in Germany are soundly structured and meet with wide acceptance, whether stationary, mobile or on the spot. In the period under review, all mobile training facilities have been integrated into vocational schools for forest workers. This concept is increasingly proving its worth.

2. There are still substantial deficits in the implementation of ergonomic findings concerning most enterprises and persons engaged in the forestry sector. This implementation therefore remains one of the major tasks to be met by forestry.

A key approach in this context is the legal basis in the form of the Act on Occupational Safety and Health (ArbSchG). Sections 5 and 6 of the ArbSchG commit the entrepreneur to assess workplaces and working techniques in terms of ergonomics, occupational safety and health protection and to document the results of the assessment. To this effect, assistance has been provided enabling enterprises to carry out these assessments easily. Apart from the national list on "assessment of hazards at workplaces in the forestry sector" (GUY 50.11.51), an international set of hazards was drafted for Germany, Austria and Switzerland, with KWF also having been greatly involved. This set of hazards can also provide a basis for the neighbouring eastern countries when they draft their own lists of hazards. This international set of hazards notably can be expected to markedly improve the consciousness of ergonomics and safety.

The increasing importance of ergonomics also manifests itself in the great pressure currently brought to bear on European standardization to adopt ergonomic aspects into the respective standards for personal protective equipment (PPE). As the European standards are to be largely adopted into the international standards of the International Organization for Standardization (ISO), ergonomics will carry more weight in international regulatory frameworks as well in future.

3. Some Land forest administrations have been concerned with the introduction of comprehensive occupational safety management systems for some time now, focusing on an integral approach to and shaping of safety and health protection.

4. Great importance is still attached to the further development of Personal Protective Equipment (PPE) and workwear, its provision by the enterprises, the making by manufacturers and the user acceptance to wear them. While new materials and more ingenious manufacturing have produced slightly more comfortable and lighter protective clothing than two years ago, PPE can still be further improved in terms of weight and wearability.

5. Another priority is the development of modern staff vehicles with adequate equipment (drying cupboards, cooking facilities, gas heatings etc.). New developments such as the use of solar energy and the redesign of rooms with opportunities to store working materials are designed to keep forest workers healthy.

6. More structurally diverse forest stands increase the risks for occupational safety, making communication among individual members of a work team extremely difficult. This increases the risk of accidents. The management of stands with a higher share of standing "deadwood" also increases the danger of accidents. Adequate strategies are to remedy this situation. Initial concepts on "deadwood management" and to limit the risks emanating from deadwood are being tested in several Land forest administrations.

b) Difficulties that have arisen and measures initiated to deal with them

1. The structural changes in forestry show that schemes of further and advanced training of the staff of forest enterprises are becoming increasingly important. There are deficits in the methodological conception of training schemes reflected in the poor knowledge of training and further training requirements at operational level, ignorance of requests by staff members for further training, a lack of cooperation by qualifying training centres as well as a lack of controlling. The providers of training schemes have acknowledged the issue of quality assurance in training and further training schemes. Working groups are currently looking for ways of solving this problem.

2. In the field of ergonomics, the actual target group, the forest workers and foresters, has still not been sufficiently covered.

The measures carried out focused on the implementation of requirements laid down in the Act on Occupational Safety and Health. The training of multipliers such as vocational

training school teachers and master foresters constituted the initial measure to improve ergonomics in forest enterprises in the past few years. These multipliers must implement the findings in the enterprises.

3. The increased use of large machinery, which can generally only be operated by one person, requires the examination of the issue of mental and psychological strain, but also of the forced positions the machine operator has to endure, for example. Initial research has not had practical consequences to date. Continuous improvements e.g. the development of well-designed drivers' cabins and control units are being advanced by positive evaluations within the framework of tests of utility value. The personal protective equipment (PPE) common in forest operations still places a significant strain on the wearer (weight, heat and moisture balance). Through tests of utility value and design, the personal protective equipment has undergone further development especially in view of safety and general wearability.

The ArbSchG calls for entrepreneurial responsibility in the servicing and maintenance of PPE. The entrepreneurs, however, regard this demand as very hard to implement. The arrangements for communal and weekly cleaning of protective suits, moisture-proof protective clothing and functional workwear and the issue of costs incurred have still not been settled. First tests are currently underway. However, the service providers wanting to render washing and cleaning services still have doubts about maintaining the safety function, e.g. in cut-proof clothing or especially in terms of testing the safety quality of such clothes. Issues of liability in this regard have not been sufficiently settled as yet. There is a need for further action here.

In structurally diverse stands, accidents sustained by individual workteam members are noticed too late. Then rescue operations are too late as well as shown by examples of accidents.

The further planning of rescue chains, telecommunication equipment and the development of adequate emergency call facilities is to address this issue. While the use of modern means of communication has proved its worth all in all, new systems can be expected to improve the situation.

c) Emerging priorities for Joint Committee activities

- . Quality assurance and controlling of further training measures for forest workers.
- . Implementation of new forms of work organization in forest enterprises, exchange of experience at international level.
- . Improvement of further training schemes for forest enterprises, machine operators and small private forest owners.
- . Improvement of occupational safety in naturally regenerated stands and in stands with a high share of deadwood.
- . Use the international exchange of experience to hold seminars on ergonomics and occupational safety, promotion of projects examining the strain on machine operators, improvement of **PPE** by intensifying research in the field of safety and wearability as well as promotion of research into accident statistics and accident analysis. The international exchange of experience plays a major role in this.
- . The promotion of health protection of persons engaged in forestry, e.g. by transferring the high standards in modern staff vehicles and **PPE** from the national level to the EU level, could be a further task.