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Business trip of National Forest Centre (NFC) employees to the Chinese Academy of Forestry

Business trip of National Forest Centre employees to the China was carried out within October 8 – 16. Delegation was represented by the director of NFC-Forest Research Institute Tomas Bucha and researchers Martin Moravcik (being at the same time delegated by Forest Europe) and Ivan Barka.

Grounds for this business trip was the working visit of the Chinese Academy of Forestry (CAF), participation in an international symposium and finalization of the outputs of the research project on the Chinese side, focusing on international cooperation and the utilization of information sources in forestry. Participants arrived to Beijing on October 9 by air from Vienna. They took part to the international symposium „Forest management planning and information integration" during October 10 – 11. Opening welcome of the symposium was submitted by Professor Lu Yuanchang from the Research Institute of Forest Resources and Information Technology. Professor Ji Ping presented the current status of implementation of Chinese project focused on international cooperation with Slovakia, for which the intermediate target is to create a set of comparative studies on forest management in China and Slovakia.

The project is funded by the Chinese side in the amount of 1 560 000 RMB (yuans, app. 200 thousand. EUR) and implemented within the years 2014–2017. This project fully reimbursed also the costs of Slovakia participants. Presentations were submitted by Slovakia participants, too. Martin Moravcik presented the results of research within the application of forest functions in the landscape, focusing on Slovak conditions, altogether with the objectives and contents of the Forest Europe Liaison Unit Bratislava Working Group. Tomas Bucha presented Lignosilva, the project of the Centre of Excellence of international significance, Centre primary focus and research innovation areas, the development of which are expected within the Centre activities. Ivan Barka presented the principles of computer modeling of forest growth by simulator Sibyla and case study involving the assessment of the foreseeable changes in predominantly spruce forests under changing climate conditions.

Interesting contributions were presented also from the Chinese side. Professor Lu Yuanchang introduced the theoretical framework of multifunctional forest management, to be used in China as a support system for the development of forest management plans. At least two utilization functions should be set under this system for each stand (e.g. production and recreational functions). Multifunctional management in this system is understood as a combination of natural forces and human activities, while the results are demonstrated by lower costs for the stands management. The individual stands in China are classified into seven degrees of naturalness, from natural forests to artificially established plantations.

As the basic principles of sustainable management of plantations have been indicated: 1) high yields from the production, 2) soil protection, 3) the variety of tree species, 4) long-term sustainability, 5) individual approach and 6) nature protection. The problem of successful implementation lies especially in the momentariness of conventional management plans, which are usually 5 years, maximum 10 years. Multifunctional management projects are developed with a view on the stand conditions and the current state of stands. The sites are classified based on soil fertility (5 levels according to humus layer status), topography and altitude. Stands status assessment take into the consideration current and target species composition, the growth phase of the forest, the natural development processes, stand structure, competition classification of dominant tree species and selection of target trees. There were seven basic models of management prepared (based on the method of stand restoration), to which the stands should be classified and involved. Long-term management plans are prepared at the country level, provinces and regions (one region is of about 400 thousands inhabitants). The long-term plans take into account

Fig. 1. The participants of international symposioum "Forest management planning and information integration", October 10–11, 2016, Beijing.

Fig. 2. M. Moravčík presents the principles of forest management in Slovakia.

the requirements of other sectors (water managers, nature protection and others.) and for their creation there is the most significant factor financial viability and benefits of the proposed management practices. Plans preparation is funded by the country, however there are also contributions of economically stronger provinces.

Professor Zhang Husaiqing introduced advanced methods of computer trees visualization and tree growth modeling. He presented various models of tree crowns, identifying their parameters by terrestrial laser scanning utilization, visualization of different details levels, from coarse features to individual branches and leaves, and pointed out the advantages and disadvantages of different approaches. He informed about the construction of a virtual cave to the CAF, which should be completed within two years.

Professor Tan Xue Ren made a contribution to the issue of stands restoration and silviculture of Korean pine (*Pinus koraiensis*) in the north-east China area. Areas of these economically important tree species are currently decreasing and there are measures necessary to be set to support further spread. Pine is grown mainly due to the production of edible seeds („pine nuts"), and China has now become the world's largest exporter and the price creator. Growing pine is however also important in terms of soil protection against the erosion and can be grown in the undergrowth of deciduous trees. Appropriate suitable procedures for the management of mixed stands with the pine were introduced (thinning, limbing) as well as methods for the creation of new and planting to the existing deciduous stands.

Professor Zhang Wenhui introduced the issue of oak stands in Shanxi. Oaks in this area are typically of age 80 years, height of 23 m and a thickness of 50 cm. He presented in particular detailed research on the optimization of management practices, the results obtained in research plots and multifunctional approach to the utilization of oak stands with a variety of non wood products utilization (acorns, bark).

The symposium continued with the presentation of Professor Wu Baoguo on decision support systems in forest management. The system with a web interface, accessible to forest managers and forest owners in China was presented (the system is developed only in the Chinese version). It includes subsystems for growth potential (based on currently occurring species or natural conditions), afforestation and forest regeneration, stands breeding, their protection and management technology. The user fills in the system decision-making table based on which the system visualizes the expected development of the stand, forecast stock and harvesting. The aim of the system is to support increasing production and utilization of forests.

The issue of remote sensing products utilization for forestry purposes in terms of China was presented by prof. Pang Young. Since China recorded 208 million ha of forest (mainly in the north-east, central and southern part of the country), remote sensing is an essential source of data. Particularly useful are Gaofen satellites (G-1 to G-7), with the spatial resolution sensing 1–16 m. They allow to monitor changes in forest condition (defoliation) at individual stands. The project "One-map" that combines aerial and satellite imagery for mapping of the forests was also presented. Radar (ALOS) and lidar imagery for biomass estimation in the stands are utilized. For determining the trees heights there is angular aerial imagery applied.

The business trip participants met at the Institute of forest resources and information technologies with Chinese partners on October 12th to discuss opportunities for further project cooperation. T. Bucha submitted the framework cooperation agreement of NFC and CAF, as well as a program of cooperation between China and Eastern European countries "China + 16 CEEC", providing a good basis for the development of specific projects. He also presented a detailed professional focus of individual parts of a project Lignosilva and opportunities for future collaborative research in this Centre.

The staff of the Chinese Research Institute identified their research priorities in the field of remote sensing, wetland ecosystems research and also expressed interest in projects focused on the creation of decision support systems using forest growth simulators and in particular the integration of existing data sources. In the afternoon field trip followed to the forest complex Xishan, mainly used for non-productive functions of forest. The main tree species there are slow growing *Platycladus orientalis*, Chinese Pine (*Pinus tabu-*

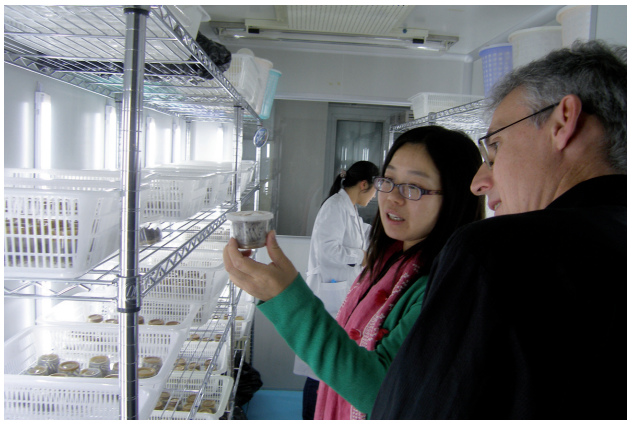

Fig. 3. In CAF laboratories, the Chinese researchers, using own patented food, breed pest populations in a sterile environment for further research.

Fig. 4. The Institute of Desertification studies in Beijing is located in modern building with high proportion of wooden material. Central part of the building is occupied by tennis court and other sport facilities are provided as well.

liformis), *Quercus variabilis, Broussonetia papyrifera* and other domestic species, which generally do not exceed 20 m height. The stands cover except the production function soil protection, water and recreational functions. Demonstrations of recreational utilization were also interesting - nature trails, scenic terraces and other leisure opportunities in the area.

Discussion of the participants with the Department for International Cooperation CAF representatives was running on October 13. Chinese partner CAF presented the CAF structure and professional focus of particular institutions, summarized the current cooperation of Slovakia and China in the field of forestry and briefly introduced the programs useful for further cooperation progress. Slovak participants also presented their suggestions. Afterwards visit to the CAF central laboratories followed, they are used for analysis for all components of the organization, as well as research laboratories for pathogens of biological pest. In this laboratory, the Chinese researchers, using own patented food, breed in a sterile environment pest populations, which consequently are used for research of efficiency of different types of their pathogens (viruses, fungi) to protect the stands. In the afternoon, participants completed a visit to the Institute of Desertification studies, which deals with various ways of promoting vegetation in dry areas, soil protection measures, soil decontamination and recultivation of former mining areas.

Working meeting of Slovak and Chinese participants on October 14 was focused on the issues of international cooperation project funded by the Chinese side, on its implementation finalization, particularly on outputs preparation. In the afternoon, Slovakia participants met in CAF with the representatives of state forest management. They introduced forestry organization and research in Slovakia, possibilities for further cooperation. Chinese side was represented by Ms Wu, who introduced the system of forest institutions in China, its priorities and programs financed by the government. As further possibilities of cooperation she highlighted the preparation of joint research projects and other mutual visits of delegations. Slovak side presented the invitation to visit Slovakia next year. Business trip participants return flight was carried out on October 16, directly from Beijing to Vienna.

Translated by I. Krišťáková

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