

Institute of Ecology of Vilnius University

**Review of biodiversity research results from Lithuania
that contribute to the sustainable use of biodiversity
in Europe**

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Research as contributor to EU Biodiversity Strategy Implementation”

Introduction

Lithuania is located in the eastern part of Europe, bordering Latvia in the north (610 km long border), Belarus to the east and south (724 km) and Poland to the south (110 km), as well as Kaliningrad region of Russia (303 km) to the southwest. Lithuania is the largest of the three Baltic countries. The total surface area of Lithuania is 65.3 thous. km² (roughly the size of Ireland). The country forms part of the great North European Plain, and landscape alternates between hilly areas and flat plains. There are two elevated regions with a maximum of ca. 290 m above sea level (the Aukštaičiai Highlands and Žemaičiai Highlands), and three plains and lowlands (the Pajūris Lowland, the Central Plain and the Southeastern Lowland). Lithuania has 758 rivers longer than 10 km, and there are 2834 lakes larger than 0.5 ha (Vaičiūnaitė, 2003a; RDP 2004-2006).

Lithuania is at the border of the boreal and the continental biogeographic regions of Europe, with predominating mixed-forest biome. It is thought that biota of Lithuania contains ca. 30 thousands of species, out of them as many as 15 000 species of insects and over 7000 species of fungi. Out of this variety, over 200 species of flora, 200 species of fauna and nearly 100 types of fungi have been assessed as declining, thus included into the Lithuanian Red Data Book. The latter regulates the protection in accordance with the international practice (Vaičiūnaitė, 2003a; RDP 2004-2006).

In Lithuania, there are 53 types of habitats of European importance, listed in Annex I of the Habitat Directive. Many of these habitat types need protection (Vaičiūnaitė, 2003a). With the factual development of the system of particularly protected areas before land reform, good preconditions for the both conservation of landscape and biodiversity in Lithuania have been created; however, part of the areas especially valuable from the biodiversity point of view are still unprotected. The biological diversity is threatened by a combination of anthropogenic factors, including the privatisation of land (increase in construction), land-reclamation, development of road and urban infrastructure (habitat fragmentation), intensified forest felling, damage of forest ecosystems because of natural calamities and pollution, change in ecologic conditions of meadows due to economic activity or its reducing (land abandonment) (Vaičiūnaitė, 2003b).

During the last decade, following the restoration of Lithuanian independence, the country became an active participant in international legal collaboration (Vaičiūnaitė, 2003a,b; RDP 2004-2006). Lithuania has joined or ratified six conventions and one international agreement regarding protection of nature and biodiversity. Lithuania has acceded to the Convention on Fisheries and the Protection of Fish Resources in the Baltic Sea and Protection Belts (Gdansk) in 1992 as well as Convention on Wetlands of International Importance (RAMSAR) in 1993. The Lithuanian Government has ratified the Convention on Biological Diversity (Rio de Janeiro) in 1995, the Convention on the Conservation of European Wildlife and Natural Habitats (Bern) in 1996, – the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Washington) in 2001, CMS - the Convention on the Conservation of Migratory Species of Wild Animals (Bonn) in 2001, and Agreement on the Bat Protection in Europe in 2001. Recently Lithuania has implemented a state programme “Gene pool” that corresponds the European Council Directive 1467/94. Lithuania is participating in the European Cooperative Programme for Crop Genetic Resources Networks (ECP/GR) and is taking part in the European Forest Genetic Resources Programme (EUFORGEN).

With the ratification of the Convention on Biological Diversity (1992), Lithuania undertook an obligation to start implementation of the Convention (Vaičiūnaitė, 2003a,b). This includes preparation of the country study and action plans. The National Environmental Strategy of Lithuania approved in 1996 was the first step in preparing the action plans for biodiversity conservation, and was used as the background for the Action Plan for Biological Diversity Conservation. The National Biodiversity Strategy and Action Plan (BDSAP) was approved in 1996. The document was prepared for 20 years although most of the actions were meant for 5

years (1998-2002) (RDP 2004-2006). The BDSAP was prepared by 8 local experts, assisted by two foreign experts, all supervised by three members of the Task Force and three experts in the Steering Committee. The local experts represented the Institute of Ecology, Institute of Botany, Vilnius University and Klaipėda University. This strategy and Action Plan follow up a "Pan-European Biological and Landscape Diversity Strategy" and are based on the Helsinki resolution H2. The BDSAP comprises six areas of action: Nature Frame action plan, forest ecosystems protection, coastal ecosystems protection, inland water ecosystems protection, wetlands and meadow ecosystems protection, and anthropogenic ecosystems protection. In addition to that it also addresses protection of species and ex-situ protection. BDSAP provides six areas of action each split into four categories: actions needed in the fields of legal-institutional regulation, territorial planning, research and monitoring, and information, training and education.

The environmental sector is probably one of the sectors, which has been mostly influenced by international conventions and treaties, establishing a framework for environmental protection and sustainable development on global and regional levels (Vaičiūnaitė, 2001, 2003a,b). The international obligations that Lithuania has a responsibility to fulfil as well as initiatives in relation to the environment, have been taken into consideration in the preparation process of the Rural Development Plan (2004-2006) (RDP). Taking into account the current situation in agriculture and rural development, it has been stressed that agriculture and forestry are of outmost importance to future socio-economic development of rural areas.

Agri-ecosystems occupy 53.7% of the total area of the country. Promotion of environmental protection and ecological farming that would uphold biological variety and landscape is one of the key objectives for agriculture and rural development (Vaičiūnaitė, 2003a,b). The main general objective of Lithuania's Agriculture and Rural Development Strategy is the implementation of the principles and measures of the EU Common Agricultural Policy. Since all territory of Lithuania is classified as an Objective 1 country in transition, the RDP contains four accompanying measures that are co-financed by the Guarantee section of EAGGF: Early Retirement, Less-Favoured Areas and Areas with Environmental restrictions, Agri-Environment (the only mandatory measure), Afforestation of Agricultural Land (RDP 2004-2006).

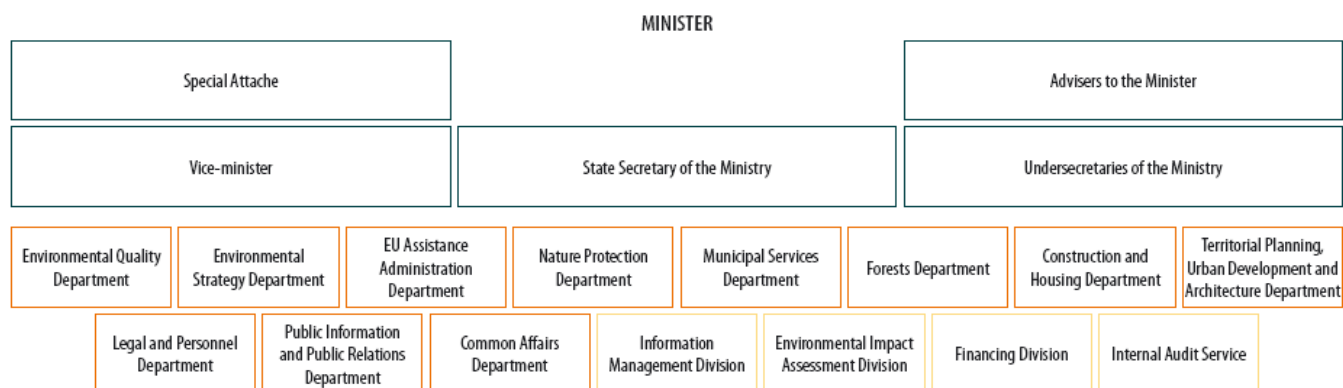
Forests cover 32.5% of territory of the country. There are 1,051,178 hectares of forests (49% of all forests) of state ownership, 717,238 hectares (33.8%) of private forests, and 352,506 hectares (16.6%) in the process of being restituted/privatised (The Lithuanian Statistical Yearbook of Forestry 2006). On the 17th of September 2002, Minister of Environment approved the Lithuanian Forest Policy and Implementation Strategy (No. 484). The main objective of the Strategy is to define the major instruments for the implementation of the forestry policy for the period until the year of 2015. The Forest Policy is implemented through four main directions, including ecological direction, which emphasise the sustainability of forest ecosystems and protection of biodiversity and improvements in forest health status (RDP 2004-2006).

This review evaluates the extent to which the research in Lithuania carried out during past decade contributes to the policy areas and priority objectives of the Action Plan of the EU COM (2006) 216 on "Halting the Loss of Biodiversity until 2020 and Beyond". The review focuses on same actions from priority objective 2 of EU COM (2006) 216: *To conserve and restore biodiversity and ecosystem services in the wider EU countryside* and from priority objective 4: *To reinforce compatibility of regional and territorial development with biodiversity in the EU*. The National Rural Development Plan (2004-2006) (prepared by the MoA in fulfilment of the obligations under Article 41-44 of the Council Regulation 1257/1999 and in accordance with the requirements laid down in the Commission Regulation 817/2004), draft National Strategy Plan (2007-2013) for Rural Development (prepared by the MoA in fulfilment of the obligations laid down in the Articles 11 and 12 of the Council Regulation 1698/2005) and issues that are elaborated by environmental specialists of the Lithuanian Fund for Nature were background papers for the present review. Data has been gathered through search of relevant literature, including web sources. The most important Internet sources are given in the list of references.

The environment protection system of Lithuania

The Lithuanian Law on the Protected Areas sets out a detailed system of protected areas that distinguishes different protection priorities: a) Areas of conservative protection priority comprise strict nature reserves, nature reserves and objects of heritage and aim to maintain certain areas of important nature or cultural heritage value. These territories, where unique and typical complexes and objects, as well as biological diversity, of natural and/or cultural landscapes are preserved, regulate and restrict most activities and land uses; b) Areas of restorable protection priority, the so-called recuperative and genetic territories, seek to restore habitats of certain threatened species in order to assure their survival and recuperation; c) Areas of ecological protection priority aim to restore and maintain outstanding ecosystems through appropriate management. In so-called ecological protection zones activities are limited to prevent negative impacts on adjacent territories or objects and the environment in general; d) Areas of complex protection are for example national parks or biosphere reserves. In the national park, different zones of functional priorities are singled out, and the park planning schemes provide for the landscape management zones. Inside the areas of complex protection all of the categories given above can occur, and the restrictions to land use and activities vary accordingly. However, designation of Natura 2000 areas in Lithuanian Strict Nature Reserves does not fully comply with the Habitats directive requirements and therefore it is necessary to amend Lithuanian legislation on protected areas (Mierauskas, 2004). Currently, the network of protected areas of Lithuania consists of one Biosphere Nature Reserve, four State Strict Nature Reserves, five National Parks, three Recuperational Plots, 30 Regional Parks, 26 Biosphere Polygons, 112 Municipal reserves, 261 State Nature Reserves (The Lithuanian Statistical Yearbook of Forestry 2006).

The Ministry of Environment (Fig.1) is the main managing authority of the Government of the Republic of Lithuania which makes proposals for the establishment of protected areas, organises formation of networks of protected areas, supplements the Red Data Book, determines the approval of projects (Vaičiūnaitė, 2001, 2003a; Vaičiūnaitė et al. 2002). Direct implementation of programmes for the conservation of biological diversity is the responsibility of strict nature reserves, national and regional parks' administrations. Special programmes aimed at the conservation of biological diversity are implemented at the local level by municipal institutions.



SUBORDINATE INSTITUTIONS TO THE MINISTRY

Environmental Protection Agency	State Protected Areas Service	Lithuanian Standards Board
Environmental Projects Management Agency	General Forest Enterprise	National Accreditation Bureau
Marine Research Center	State Forest Survey Service	State Metrology Service
Lithuanian Geological Survey	Forest Sanitary Protection Service	State Territorial Planning and Construction Inspectorate
Lithuanian Hydrometeorological Service	Forest Genetic Resources, Seeds and Plant Service	Construction Production Certification Center
State Environmental Protection Inspectorate	State Forest Management Planning Institute	Departmental Archive
Lithuanian Environmental Investment Fund	Plant Gene Bank	
"Soil Remediation Technologies"	Kaunas Tadas Ivanauskas Zoological Museum	
	Vačovlas Intas State Museum of Stones	

Fig. 1. Ministry of Environment (MoE) of the Republic of Lithuania (2006) source: http://www.am.lt/VI/en/VI/files/File/Aplinkos%20ministerija_web.pdf

All the municipalities of Lithuanian cities and districts have environmental units or responsible officials. Pursuant to the Law on Environmental Protection, municipal institutions within their competence arrange for the implementation of environmental protection legislation and decisions on the issues of environmental protection made by the Government and the MoE.

Although local governments have the opportunity to create nature reserves, most protected areas in Lithuania are established and managed by the state and supervised by the State Protected Areas Service - an umbrella authority under control of the MoE to coordinate the activities in the protected areas (Grivickė, 2004). While for the practical territory management and co-operation with stakeholders the director of the protected area is held responsible, the strategic decisions on the management priorities are taken at the State Protected Areas Service. Forest Department of the MoE deals with forest conservation issues. For the implementation of forest policy measures there is forestry administration created and functioning in Lithuania (Fig 2).

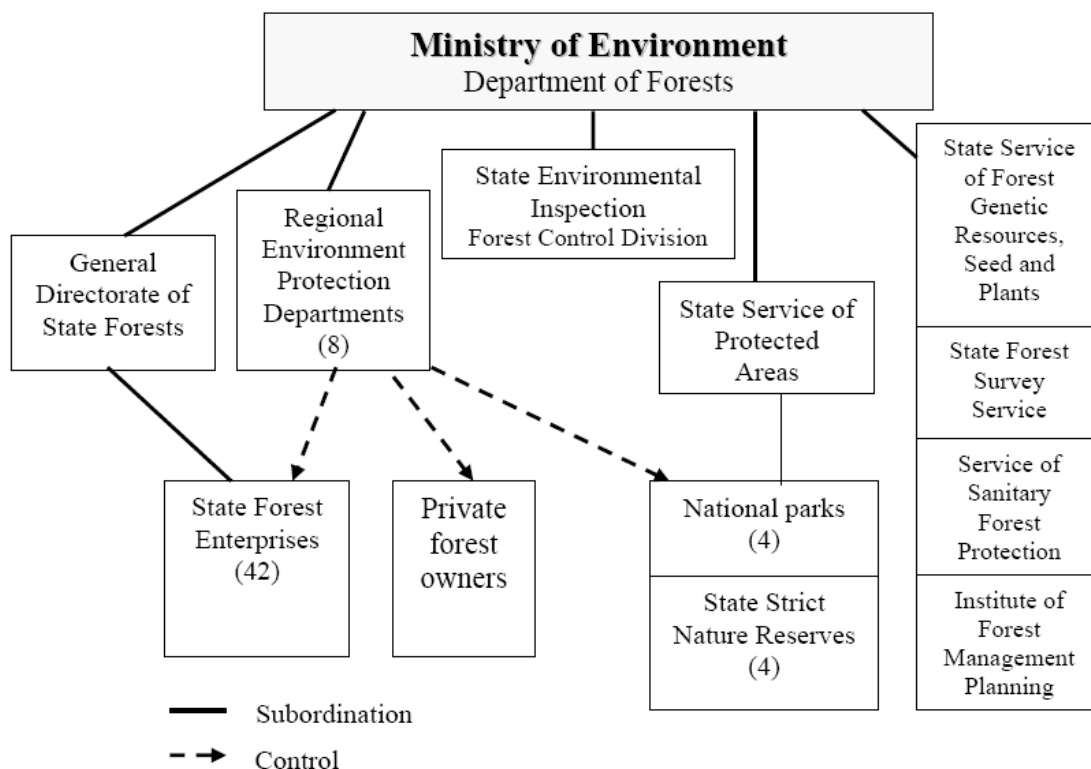


Fig. 2. Forestry administration scheme (Kupstaitis, 2005)

Planning of Protected Areas

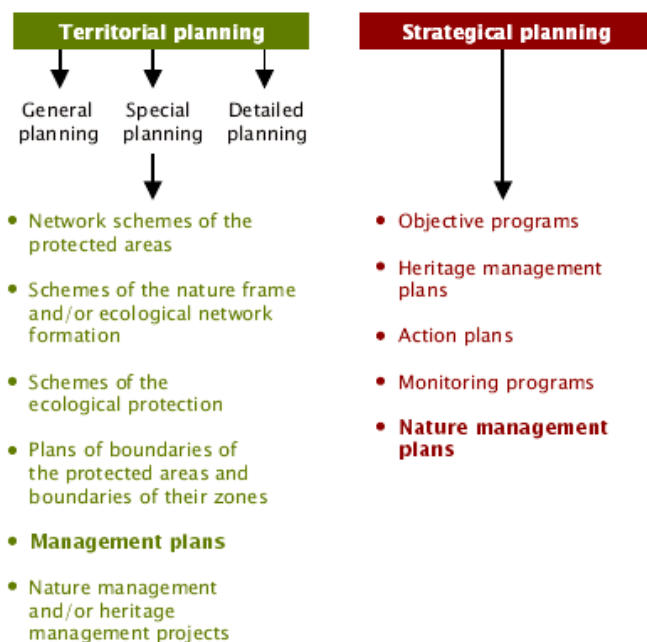


Fig. 3. Scheme of territorial and strategical planning of protected areas. Source: http://www.wetlands.lt/docs/Report_Dovine_lores.pdf

Universities of Vilnius, Kaunas and Klaipeda having faculties of biology, the Institute of Botany and the Institute of Ecology of Vilnius University are the leading institutions to identify, study and monitor the components of biological diversity in Lithuania.

The main NGOs working in the field of biological diversity conservation are Lithuanian Fund for Nature (LFN), Lithuanian Ornithological Society, Lithuanian Theriological Society, Lithuanian Entomological Society and Lithuanian Botanical Society. The contribution from the LFN, Lithuanian Ornithological Society and others and materials collected during their projects are valuable source for biodiversity assessment.

Description of main findings of the selected studies

Identifying high value farmland and forest areas

A2.1.3. Define criteria and identify [2006-07] high-nature-value farmland and forest areas (including the Natura 2000 network) threatened with loss of biodiversity (with particular attention to extensive farming and forest/woodland systems at risk of intensification or abandonment, or already abandoned), and design and implement measures to maintain and/or restore conservation status [2007 onwards]

Implementation of Natura 2000

Since the beginning of 1999, the first step in the implementation of Natura 2000 in Lithuania was the project of responsibility of EU approximation, supported by the Danish governmental funding agency Dancee in co-operation with the Lithuanian MoE. It aimed to provide a solid scientific and legal basis for the final selection of sites to be protected under the Natura 2000 network of Lithuania. However, only part of the selected sites were designated SPAs or pSCIs. Limited resources could not ensure detailed investigation of all potential sites, which is why the methodology was not applied correctly in some cases (Ungerma et al, 2005). Not all the land owners were informed that their private property had appeared in the territory of the network “Natura 2000“, and they should fulfil nature management activities and restrict some economic activities in their land (The Supreme Audit office ..., 2006).

A list of proposed Natura 2000 sites suitable for the protection of the species and habitats covered by the Habitats and Birds directives was produced and submitted to the European Commission for consideration at the date of accession. Unfortunately the MoE did not adopt the ecological network concept, but adopted the “Nature Framework” instead, which did not allow for the formation of a coherent network of Natura 2000 sites protected by buffers and linked by corridors. The “Nature Framework” is rather based on physio-geographical and geomorphologic features, and so it is not particularly well-suited to biodiversity conservation or Natura 2000 (Ungerma et al., 2005). By 1st January 2006, Natura 2000 network, estimated without intersecting the overlapping areas, was 784,700 ha (73 SPAs and 266 pSCIs), and covered 12% of country’s territory (The Lithuanian Statistical Yearbook of Forestry 2006). It was expected a substantial increase of pSCI’s (both, in terms of number and area) in 2006-2007 due to implementation of the decisions of Biogeographical seminar for the Boreal region held in December 2005 (SPR).

As result of projects aimed to develop the Natura 2000 network in Lithuania, the guides to the habitats of European importance (Rašomavičius et al., 2001) and to the species protected by the EU Habitat Directive (Baranauskas et al., 2006) were produced.

Four territories of the Natura 2000 network have been designated as the model sites for the Long Term Ecological Research (LTER) (Švažas & Dagys, 2004; Švažas et al., 2005).

In summary, though in Lithuania, the strict management control system is implemented by abundant data reporting, monitoring application, biota inventory and even site supervision, human violations in protected areas are still significant, the main reason for which is unfavourable economic situation in the country (Žalakevičius, 2002; Grivickė, 2004; Žalakevičius et al., 2006). Resources which are directly related to ensuring a favourable conservation status of habitats and species are very limited. Lithuania has not yet co-financed Natura 2000 projects (Ungerma et al., 2005). Although Structural Funds can finance management of Natura 2000, most resources were allocated for management of recreational facilities in protected areas instead for particular SPAs and pSCIs. The available Structural Funds and the Financial instrument for Environment (LIFE +) will be used for the management of Natura 2000 and biodiversity but the possibilities available within European Agricultural Fund for Rural Development are the most appropriate for that due to the focus on land managers as beneficiaries and the potential to support the specific land management practices (SPR)

The degree of awareness and understanding of Natura 2000 among stakeholders differ in a following manner (Ungerman et al., 2005): MoE and its agencies - good level of awareness while MoA staff - less aware, but it is more or less sufficient; governmental organisations and agencies of development sectors (transport, economy, energy, etc.) - not sufficiently; regional and local administrations - even less aware (except in the ecology sector in the municipalities); national-level forest owners, landowners or farmers, hunting and fisheries unions/organisations - quite well aware and informed; organisations at the regional and local level - much less informed and awareness is not sufficient; grassroots organisations, individual landowners or users - insufficiently aware, except in areas where pilot projects have been carried out on Natura 2000 requirements.

The order of payment of compensations was adopted in 2004, nevertheless the owners and managers of private land and forest started to submit the applications for compensation payment only in 2006 (The Supreme Audit office..., 2006). According the adopted order of compensations payment, the mentioned compensations should be payed out in 2007 from the state budget. Government has not yet adopted the order of payment of compensations to agricultural subjects worked out by the MoE and the MoA, so nobody can be convinced that there exists a possibility to start to pay out the compensations in 2007. This can influence negatively the establishment of new protected territories and the implementation of Management measures in the territories of agricultural activities of separate subjects.

High value forest areas

As the highest percentage of land covered by forests is in the southeast part of Lithuania where soil productivity is low, forestry provides an important alternative source of additional income for rural dwellers. Therefore, forestry is considered as one of diversifying activities in rural areas having the potential to generate new job opportunities and an alternative source of income (Vaičiūnaitė, 2001; RDP 2004-2006). Hence, both non-wood forest product utilisation and afforestation of abandoned agricultural land provide a sound basis for rural development initiatives, which aim to increase income-earning opportunities while maintaining environmental quality. Lithuania has not developed any of its own special criteria and indicators for sustainable forest system. Most criteria and indicators have come directly from the Pan-European system. Only one additional criterion, the percentage of private forests, is being used. The reason for this is a regularly increasing share of private forests and significant influence of the private forest sector on sustainable management of the country's forests. (RDP 2004-2006).

As a result of too intensive and irrational activities, Lithuanian forests are in critical state due to excessive felling, disproportionate numbers of coniferous and deciduous trees, extremely small percentage of mature forests and their uneven distribution (Vaičiūnaitė, 2001; Kurlavičius, 2006). Environmental values are hardly influenced by present process of privatisation leading to the intensive forest felling, distruction of small forests which are of particular importance to the biological and lanscape diversity (Kurlavičius, 2005; Pivoriūnas & Kurlavičius, 2005).

According to the Forest Law, forests are divided into four groups upon the objectives of the economic activities, their regime and the major functional purpose:

I forest group – strict reserve forests (no forest felling)

II forest group – forests of special purpose (IIA - ecosystem protection forests and IIB - recreational forests, no clear cuttings are allowed)

III forest group – protective forests (clear cuttings up to 5 ha allowed)

IV forest group – economic (commercial) forests (clear cuttings up to 8 ha allowed)

These groups are easily fitted into categories of the international classifications. All protected areas cover 15.2% of the territory of Lithuania, and the Protected Forest Areas (PFA) occupy 18.8% of the total forest area. 77% of PFAs are primarily dedicated to the conservation of forest biodiversity. The National Forest Inventory is carried out in all forests of Lithuania including PFAs (Kuliešis et al, 2003). Standwise inventory is required to all forest owners and carried out every 10-15 year. Such management plans are made for strict nature reserves and

National Parks where the only differences are the aims and objectives of the inventory. The inventory in protected areas gives more emphasis to biodiversity elements. Measures for biodiversity protection are defined (Belova et al. 2006). Šaudytė et al. (2005) highlight weakness of official classifications related to forest naturalness in Lithuania, analyse current situation and proposed six definitions of different forest naturalness classes with their describing criteria.

As Lithuania exports round wood and its products, the forest certification is becoming the important part of Lithuanian forest policy and strategy. The Department of Forests and Protected Areas since 1997 started to analyze the possibility to implement international forest certification schemes (Forest Stewardship Council – FSC and Pan-European Forest Certification - PEFC) in Lithuanian private forest sector (Augutis, 2005). The preparation work is being carried seeking to become the member of PEFC (Kupstaitis, 2005).

The current legal framework for forest management is in many respects in conflict with biodiversity conservation requirements (excessive logging, re-establishment of monocultures after clear-cutting, removal of dead trees) (Hesselink et al., 2004; Peleckas, 2005; Pivoriūnas and Kurlavičius, 2005). In order to support sustainable forest management in Lithuania according to the obligations in the Convention of Biodiversity, the Swedish Environmental Protection Agency has supported programme on Woodland Key Habitat Inventories (WKHI) of state, private and reserved for privatisation forests in Lithuania (2002-2005). The implementing organization was the Swedish Regional Forestry Board of Östra Götaland in co-operation with the Forestry department at the MoE (Sohlberg 2004). The project has been coordinated with the Danish – Lithuanian project on EU Habitats and Bird Directive. The outcomes were as follows: “Woodland Key habitat Inventory in Lithuania” atlas (Andersson et al., 2005), the booklet “Insects of Key Wood Habitats” (Ehnström et al., 2003) and the methodological tool “Lichens, fungi and mosses of Woodland Key habitats” (Iršėnaitė et al. 2002). As mapping of Woodland Key Habitats is required by forest certification schemes they provide a tool for maintaining a large share of forest biodiversity in a cost-effective way (Hesselink et al., 2004).

The ecological forest functions have intensively been studied in Lithuania (Karazija, 1994; Pauliukevičius & Kenstavičius, 1995; Karazija & Vaičiūnas, 2000; Kuliešis & Petrauskas, 2000), including destructive influence of clear cuttings, deforestation and recreation as well as recommendations on the management in protected forests and priorities for afforestation. It has been proposed (Danusevičius et al., 2002) to plan the afforestation programmes towards a simultaneous improvement of ecological conditions in the region of interest and achievement of economic benefit from production of wood. Growth, undergrowth, ground cover, and herbal vegetation were studied in self-regenerated forest areas and forest plantations on abandoned agricultural lands (Urbaitis, 2003). Influences on mineral topsoils on common tree species (oak, lime, ash, birch, beech and spruce) were studied in 30 to 40-year-old stands planted in adjacent plots on former arable land (Hagen-Thorn et al., 2004). It has been suggested (Lazdinis, 2002) that potential effect of international legal instruments and processes on afforestation activities in Lithuania is insignificant except two documents, Convention on Biological Diversity and Kyoto Protocol. Successful conversion of farmlands requires wide-scale educational work with different groups of landowners and an example is the East Lithuania (Ribokas & Rukas, 2006) where the majority of landowners (about 70%) are irrationally unwilling to forest their lands. Several pilot projects promoting agricultural land afforestation have been fulfilled (Hübertz et al., 2002; Kriveliene, 2002; Palčiauskaitė, 2002).

There is experience in biological and ecological fundamental research on establishment of forest plantations in Lithuania (Gradeckas & Malinauskas, 2006), oak stands preservation (Gradeckas, 1997; Gradeckas & Karazija, 1997), dynamics of pine forest communities (Karazija, 2003), distribution of the lime stands (Marozas & Samaškienė, 2003). Distribution of 94 native dendroflora species of Lithuania according to the level of tolerance to different ecological factors has been determined (Ozolinčius, 2004).

Jukonienė and Stankevičiūtė (2005) presented the characteristics of vegetation and survey of botanical investigations carried out in four LTER sites of Lithuania viewing some of them as

models for observations on the ecosystem response to global climate changes. During the studies of bryophytes in Viešvilė Strict Nature Reserve (Jukonienė, 2003), 208 species were registered; eighteen of them were Red Data Book of Lithuania species. Five areas within the territory of the Strict Nature Reserve, rich in bryophytes and rare bryophyte species, are proposed as important bryophyte areas. Lichen diversity along the Via Baltica highway has been evaluated with reference to effect of different land-use (Motiejūnaitė & Faltynowicz, 2005).

High nature value areas of farmland

Agri-ecosystems are all particularly insufficiently studied: only some of their functional aspects are known. The agricultural crisis after restoration of independence in Lithuania speeded-up the degradation of meadow and other open habitats due to the decline of grazing and mowing in some areas. Currently successional processes are taking place in those abandoned areas, and the open areas are becoming overgrown with bushes and tall grasses. Such conditions lead to local loss of meadow grassland habitats, and thus decline of some rare bird populations. On the other hand, with land privatisation and less intense agriculture, an increase in the areas' disintegration and their diversity, with a certain part of previously cultivated lands lying fallow and becoming overgrown with shrubs and trees, with a reduced or even nearly no use of mineral fertilisers and chemicals as well as with the disappearance of consequences of earlier land reclamation, some ecosystems of agri-environment are becoming suitable for an increasing number of plant, fungi and animal species. Natural meadow ecosystems, particularly in forests and river valleys, typically boast the richest diversity of plants and related invertebrate and fungi. However, during the last 30 years the area of natural meadows has decreased (RDP 2004-2006). Most of the natural and semi-natural meadows and pastures, all swamps, also surface water bodies are regarded as high nature value areas in Lithuania. Many of these areas are the Natura 2000 sites, thus preservation of these habitats will also ensure preservation of the typical agrarian landscape. According the inventory of natural meadows carried out in 2005 by Lithuanian Fund for Nature and Institute of Botany, there is about 42100 ha of such areas. Furthermore, there is about 81000 ha of wetlands (SPR 2007-2013).

The general structure of farmland bird communities in Estonia, Latvia and Lithuania was explored based on the large-scale survey in 2002 in relation to agri-environment planning in the region (Herzon et al. 2006).

The research on sown mesic grasslands (10-11 years of running) characteristic by their composition to the Central Lithuanian Plain region has been conducted (Sendžikaitė & Pancekauskienė, 2003). The state of sown meadow communities (10-14 years of running) of different intensity of management (intensive and extensive using) was studied (Sendžikaitė & Pakalnis, 2006). The investigation of flora in protected and non-protected natural area of Šilutė district was performed in 1997-2003 (Smaliukas et al., 2005), 22 rare and protected plant species were detected, and means of their protection were provided.

A historical review of the utilization of economically important wild plants in Lithuania with providing a legislative basis for preservation of wild flora through governmental acts and regulations has been presented (Budriūnas, 1999).

Important wetland areas

Čepkeliai strict nature reserve mire is the largest mire complex in Lithuania that contain representative and unique examples of natural wetlands, characteristic of the Eastern Baltic Region (Lapelė & Rašomavičius, 2003). The Ramsar methodology was used as the basis of the countrywide inventory of important wetlands in Lithuania in 1996-1999 and 30 Lithuanian wetlands meet the Ramsar criteria qualifying them as of international importance (Švažas et al., 1999; Švažas et al. 2002; Švažas et al. 2003a). Lithuanian Wetlands Database has been created including data: on the important wetlands in each region or district, on the species and communities in each important wetland, on the land use and conservation recommendations at the species or community level, on the visualisation (maps at several levels: from national to local). Part of the areas important for waterfowl is large artificial fishponds (Švažas & Kozulin,

2002). A database of transboundary wetlands has been created (Švažas et al. 2003b) and designed as a tool for regional and local decision-makers. It includes boundaries of important sites, maps of the fauna and flora species distribution, information on valuable habitats and recommendations concerning further management of certain areas. A great diversity of habitats creates excellent conditions for numerous species of rare and threatened plants and animals. The ecology of Garganey and Shoveler in Lithuania have been studied (Švažas et al. 2003c), including management measures and conservation recommendations for the landowners, promoting traditional use of wet meadows for grazing and haymaking, the implementation of the agri-environmental schemes.

Important areas for birds

The most detailed information on the areas important for bird species of European concern in Lithuania was provided by Raudonikis (2004): abundance and distribution of declining bird species, threats arising to them and recommendation for mitigation of negative impacts, land-use and ownership forms, present conservation status, etc.

Angelstam et al. (2004) assessed to what extent the specialised forest-dwelling species listed in the EC Birds directive cover different forest types and ecoregions associated with the drainage basin of the Baltic Sea. Identifying high conservation value forests in the Baltic States from forest databases has been proposed by Kurlavicius et al. (2004). The effects of clear-cutting on bird communities in mixed deciduous old forest in south-west Lithuania were assessed (Brazaitis, 2003; Brazaitis & Kurlavičius, 2003; Brazaitis & Angelstam, 2004; Brazaitis et al. 2005). (Lazdinis et al., 2005) assessed how habitat re-creation as designed in alternative afforestation plans for two administrative regions in Lithuania will affect the functionality of the landscapes for bird species of conservation concern. It is stressed that to ensure functionality of habitat networks, landscape ecology and conservation biology should be more commonly incorporated into afforestation planning. The habitat requirements for breeding territory of Lesser Spotted Eagle (*Aquila pomarina*) in Lithuania are studied (Treinys, 2004) including conflicts with timber harvesting (Treinys & Mozgeris, 2006). A detailed assessment of suitable nesting areas for Black Stork, with the highest likelihood of breeding, was made with the help of GIS and local envirospace modelling (Augutis & Sinkevičius, 2005).

Important areas for mammals

Special areas for lynx (*Lynx lynx*) conservation in Lithuania were selected following the European Union requirements using data on the annual census (1970-2000) and on special research (1991-1995) (Bluzma, 2005). After the amendments made by the MoE, the final list including seven territories (180 400 ha) was presented to the European Commission sites.

Geographical distribution, abundance and habitats of the dormice (Juškaitis, 2003b,c, 2004) and wood mouse and pygmy field mouse (Juškaitis, 2003a) have been intensively studied in Lithuania including methodological aspects (Juškaitis, 2006). Because of the intensive forest management, recommendations on necessary means for the forest dormouse protection were prepared and presented to the MoE (Juškaitis, 2005). Distribution and abundance of small mammals were investigated in the landscape of hilly morainic uplands in eastern Lithuania (Mažeikytė 2002). Mammals of Dzūkija National Park have been studied using snow-transects, small mammal trapping, questionnaires for local people, data from published sources, reports, official census, and graduation theses (Ulevičius & Juškaitis, 2003). Seven out of the species studied are included into the Red Data Book of Lithuania: *Glis glis*, *Sicista betulina*, *Lepus timidus*, *Mustela erminea*, *Lutra lutra*, *Lynx lynx* and *Bison bonasus*. Changes of species composition and abundance in small mammal communities after the abandonment of agricultural fields were studied in forest fragments and the surrounding agri-ecosystem matrix (Šinkūnas & Balčiauskas, 2006).

Areas for terrestrial arthropods

Jonaitis et al. (2002) generalized long-term research data on the structure, resources and stability of host-parasitoid systems functioning in fragments of agricultural ecosystems of

Northern Lithuania. There has been generalized both the published and original data on over 40 years of investigation in four strict nature reserves (Jonaitis & Ivinskis, 2003; Rimšaitė et al., 2005). Over 3000 species belonging to 9 orders of insects were recorded in Lithuanian strict nature reserves as well as the distribution and relation between species of some groups of ichneumonid fauna were analysed. Ground-living spiders were studied on peat bogs from southern Lithuania to northern Finland (Koponen et al., 2001). The data from Lithuania on the distribution of threatened insects, included into Annexes of the EU Habitat Directive, the beetles *Osmoderma eremita* (Ranius et al., 2005) and *Boros schneideri* (Karalius et al., 2006), and the butterfly *Maculinea teleius* (Uselis et al., 2006) were presented. The species composition, richness and abundance of ground and rove beetles of agri-ecosystems were studied in conventionally and ecologically farmed winter wheat using Barber's traps at the training farm of the Lithuanian University of Agriculture, in central part of Lithuania (Tamutis et al., 2004). *Pterostichus* species composition, distribution and abundance dynamics in different age and structure agri-ecosystems (winter wheat, barley, *Phacelia*, grass field) has investigated, using pit fall traps (Tamutis, 2002).

Selected research projects related to identifying of important for biodiversity areas

Lithuanian Fund of Nature (<http://www.glis.lt>):

- “Biodiversity and Conservation Values on Former Soviet Military Areas in Lithuania” (1992 - 1994)
- “Conservation and Management of Lithuanian Wetlands”. (1995 - 1997)
- “Site Identification for Natura 2000 Priority List and Shadow List of Sites in Lithuania”;
- “Restoration of the Puscia Bog” (2000 - 2001)
- “Emerald Ecological Network Pilot Study in Lithuania (2001-2002)”;
- “Protection of Nests of Birds of Prey and Valuable Forest Habitats” (2001-2002);
- “National Grassland Inventory in Lithuania” (2002 – 2005)
<http://www.veenecology.nl/data/Lithuania.PDF>
- “Conservation of Rusne island” (2002 - 2004)- management of abandoned grasslands
- “Group certification for private forest owners in Lithuania” (2002-2005) (Augutis, 2005);
- “Conservation of two *Aquila* Eagles species in Lithuania” (2002-2004);
- “Driving Responsible Forest Management and Curbing Illegal Activities in the Forest Sector” (2005-2008);
- “Black Stork protection” (2005-2006);
- “Protection of Pond Turtle *Emys orbicularis* and amphibians in the North European lowlands” (2005-2009);
- “Scorecards of the Forest Sector in Lithuania”

Nature Heritage Fund (<http://www.wetlands.lt>):

- “Management and Restoration of Natura 2000 sites in the Dovine River Basin Pilot project for a combined implementation of the EU Water Framework Directive and the EU Birds and Habitats Directive in Lithuania”
http://www.wetlands.lt/docs/Report_Dovine_lores.pdf; (Gulbinas, et al. 2006).

Lithuanian Forest Research Institute (<http://www.mi.lt/mokspadaliniai.htm>):

- “The investigation of silvicultural and technological factors influencing afforestation of former agricultural lands” (2000-2004);
- “Contemporary digressions of forest ecosystems: influencing factors and methods of indication” (2003-2008);
- “Forest stand formation according to the principles of ecological forestry” (2003-2007);
- “Assessment of renaturalisation of sandy soils in former agricultural lands with planted Scots pine forest” (2003-2007);
- “Economical regulation of Lithuanian state and private forestry” (2000-2004).
- “Nordic database for Long-Term Forest Experiments” 2000-2006;

- “Protected Forest Areas in Europe – analysis and harmonization” (2001-2006) (COST E27 PROFOR)

Influence of national plans of CAP implementation on biodiversity

A2.1.4. Ensure effective implementation of cross-compliance (which provides a baseline for most of the measures of Axis 2 of the Rural Development Regulation) in ways that benefit biodiversity [2007-2013]

Public agriculture and rural development policy is being set out in strategic agricultural and rural development documents approved by the Parliament and the Government of the Republic of Lithuania. These include the National Long-term Development Strategy, Agriculture and Rural Development Strategy, the law on Agriculture and Rural development and other documents. The main general objective of Lithuania’s Agriculture and Rural Development Strategy is the implementation of the principles and measures of the EU CAP (Uosytė, Ciapaitė 2005).

The present National Strategy for Lithuania is one of the basic documents outlining the policy framework for Lithuania for strategic management of the rural development programme for the period 2007-2013. The vision of the Lithuanian rural development for 2013 is to:

- Improve the competitiveness of agriculture and forestry by supporting restructuring, development and innovation.
- Improve the environment and landscape by supporting environmentally friendly methods of land management.
- Improve the quality of life in rural areas and encouraging the diversification of economic activities.

Lithuania as a new Member State which joined the EU in 2004 does not have an obligation to apply the cross compliance legislation before 2009 (Dimopoulos et al., 2006). Currently Lithuania has established some Good Agricultural and Environmental Condition (GAEC) standards but no Statutory Management Requirements measures. These standards address issues like manure spreading methods, soil erosion, permanent pasture and landscape protection.

Pilot agri-environmental measures were included in Lithuanian SAPARD Programme. The implementation of this measure is hold back by the fact that the National Paying Agency has not been accredited for the implementation of this measure yet. No experience from SAPARD in implementing the Afforestation and Agri-environment measures could be presented at the stage of developing RDP 2004-2006 as both measures have not been started in Lithuania yet (RDP).

EU pre-accession support through SAPARD and further access to the EU funds from EAGGF has led to significant advance in developing and upgrading agriculture, forestry and fishery sectors through e.g. modernisation of farms, processing industries and other economic operations within these sectors (SPR). All administrative structures and systems in the form of the National Paying Agency, the Lithuanian Agricultural and Food Product Market Regulation Agency, the Integrated Administration and Control System that are needed for managing EU funds have been established and are operating.

Pillar 1 of CAP forming the basis for the direct payments and market measures is aiming to increase competitiveness and is complimenting the Pillar 2 which is to address the rural development and environmental considerations in the meantime. The implementation of the actions under both CAP pillars is closely related and complements each other in the following manners (random listing):

1. Good agricultural and environmental condition- The development of the agricultural sector goes hand in hand with environmental considerations and Lithuania there are mandatory requirements set to keep the land subject for support both under the Rural development programme as well as direct payments in good agricultural and environmental condition. Later, when Lithuania chooses to implement the Single Payment System for direct payments the cross-compliance requirements, which will oblige farmers to comply with

several environmental, animal welfare and food safety standards in order to receive the full amount of direct payments. These requirements compliment the actions under Pillar 2 aiming at applying environmentally farming practices within high nature value areas (like Natura 2000), traditional agrarian areas, the Less Favoured Areas. It is especially crucial in case of abandoned land being subject to direct payments (if the owner decides to turn it back to UAA) and to ensure that such land is meeting the set requirements.

2. Human resource development - provision of training, consultancy services, information as well as awareness will improve the abilities of those subject to payments under Pillar 1 to comply with the set cross-compliance requirements. Also the entrepreneurial skills of rural population as well as abilities to get engaged in alternative business to agriculture will significantly contribute to the competitiveness of agrifood sector.
3. Modernisation and technology – these actions will result in improved technologies and farming practices as well as processing, will create higher value competitive products and at the same time ensure compliance with EU standards. Therefore the received support under Pillar 1 will enable the economic entities to accumulate higher income and in return increase investments.

Selected research projects related to the CAP implementation

Lithuanian Fund of Nature (<http://www.glis.lt>):

- “AGENDA 2007: Integration of Polish Environmental and Consumer Organisations into the Discussion about the Reform of the European Agricultural Policy Agenda 2007”. Since the reform of the European Agricultural Policy is important issue also in other countries, Lithuanian Fund for Nature helps to distribute project ideas in Lithuania;
- “Strengthening Capacity for Agri-environmental Programming and Implementation in Lithuania” (2003 - 2004). The purpose of the project is to support the development of the institutional capacity (at national and local level) that is necessary for the full and effective implementation of EU-funded agri-environment measures in Lithuania;
- “Transfer of European Knowledge from the Area of Nature Management to Lithuanian Nature Protection Institutions and Environmental non-governmental Organisations” (2000 - 2001) (Stončius et al., 2001). to emphasize the importance of nature management in biodiversity conservation and transfer knowledge and experience of EU countries in preparation of management plans and managing habitats to nature protection institutions and non-governmental organisations;
- “Preparation of the Agri - environmental Program for Lithuania” (1997-2000). The National Agri-environmental Program and the Agri-environmental Pilot Scheme of Rusne island (one of the SAPARD pilot areas were submitted to the Ministry of Agriculture);
- “Impact of the Common Agriculture Policy (CAP) on Protected Areas in chosen EU – Accession Countries” short information on the planned implementation of the CAP in Accessing Countries. As the empirical basis, the Aukštaitija National Park and Žuvintas Biosphere Reserve have been chosen.

Develop indicators and monitoring schemes

A2.1.8. Implement the common monitoring and evaluation framework and Strategic Environmental Assessment (SEA) Directive requirements where applicable for rural development programmes, including the definition of indicators in a way that impact of measures on biodiversity is assessed [2006 onwards]

There are following Impact Indicators for axis II priority 2.3: Preservation of biodiversity and development of high nature value and traditional agrarian areas for biodiversity area (SPR):

Population of farmland birds (present population and population change): Northern lapwing (*Vanellus vanellus*): 18 – 20 thous., decreasing; Corncrake (*Crex crex*): 25 – 30 thous., increasing; Grey partridge (*Perdix perdix*): 10-20 thous., decreasing; White stork (*Ciconia ciconia*): 12.5 – 13 thous., increasing; Eurasian tree sparrow (*Passer montanus*): 300 – 500

thous., decreasing; Yellow hammer (*Emberiza citrinella*): 600 – 750 thous., stable; Eurasian skylark (*Alauda arvensis*): 1.1 –1.5 mln., decreasing. Impact objective in 2013 is to minimize the decrease of the population, to maintain the positive changes.

High nature value farmland areas (present situation): 266 pSCI's covering 649271 ha (or 9.94% of Lithuania's territory) identified; 73 SPA's covering 523580 ha (or 8.02% of Lithuania's

territory) identified. Natural and semi natural meadows make 42,1 thous.ha of UAA, swamps – 81 thous. ha, all together 3.1% from UAA.

Tree species composition (present situation): 2004 conifers – 58.1%. Soft broadleaves – 37.2%. Hard broad leaves – 4.7%. As impact objective in 2013; broadleaved tree species must make at least 30% in newly established forests

The Law on Environmental Monitoring was adopted in November 1997. The Environmental Monitoring Program (EMP) was approved in June 1998. In terms of biodiversity monitoring, it comprises four relevant components. These are monitoring of vegetation, wildlife and agricultural ecosystems and integrated monitoring of semi-natural ecosystems.

The EMP is a comprehensive program covering a large number of elements of biodiversity monitoring. As referred in the document, the main constraints to the implementation of the program are the financial ones. Thus, the vegetation monitoring is exclusively forests monitoring. Monitoring of wetlands, meadows, aquatic vegetation as well as rare and threatened plant species is non-systematic and financed well behind the actual needs. (Vaičiūnaitė 2003b).

Monitoring of agricultural ecosystems was initially started in three stations, but ceased to a single site due to the lack of funds. Monitoring of Wild Fauna experiences the same insufficient funding situation. Full implementation of EMP is foreseen, including the biota monitoring.

Based on the information provided in BDSAP and the First National Report to CBD, Lithuania has notable achievements in inventories and identification of components of biological diversity. Due to restricted financial resources the Environmental Monitoring Program and Inventories of range of species groups and habitats can't be finished at this time.

The Forest Inventory and Management Institute periodically conducts stand-wise inventory in state and private forests. The institute at regular intervals carries out forest and game management planning, forest mapping and strategic planning of forestry. Information of forest monitoring has being analysed periodically. Research results on forest biodiversity are available from projects of research institutions: Lithuanian Forest Research Institute and Forestry Faculty at Lithuanian Agricultural University. The results of the projects have been published and are accessible to the general public as well (Vaičiūnaitė 2003b).

Purposive monitoring of biological diversity is not performed in Lithuania (Žalakevičius, 2002) although some kind of ecological monitoring (insufficient because of financial deficiency) of flora and fauna is carried out in some stations (Augustaitis et al., 2006). In some years these investigations were even terminated because of funding withdrawal. Hence, Lithuania still faces a serious unsolved problem– the absence of the Country study of national biodiversity This problem impedes the implementation of a number of practical environment protection projects and handicaps the drafting of the documentation for biodiversity conservation.

Genetic diversity of crop varieties, livestock breeds and races

A.2.1.11. Strengthen measure to ensure conservation, and availability for use, of genetic diversity of crop varieties, livestock breeds and races, and of commercial tree species in the EU, and promote in particular their in situ conservation [2006 onwards]

Local livestock breeds and races

The Rare Breeds Scheme of the RDP (3.8.4) is designed to preserve the local breeds of animals in danger of being lost to farming. The objective of this measure is to encourage keeping and rearing of local endangered breeds of native domestic animals.

Potential beneficiaries are allowed to breed animals by the pure-breeding only, i. e. using animals of breeding inside race only, in accordance to the breeding plan.

Participants of the programme may renew the animal herds purchased from Gene Fund herds only, or typical animal races, find during expeditions, organised by competent authorities. Number of animals involved in a programme established by recommendations of the competent authorities, depending on breeds. Number of animals indicated in a commitment.

The local breeds in danger of being lost to farming and the number of breeding females according to the Register of gene fund on 12th of December 2003 are the following:

- Žemaitukai horses (incl. big Žemaitukai) – 188 females;
- Lithuanian Weighted horses – 280 females;
- Lithuanian Rufous cattle – 100 females;
- Lithuanian Black and White cattle – 100 females;
- Lithuanian Ash-Grey cattle – 680 females;
- White-Backed cattle – 493 females;
- Lithuanian White pigs (old genotype) – 86 females;
- Lithuanian Native (Wattle) pigs – 150 females;
- Lithuanian Native Coarse woollen sheep – 554 females
- Lithuanian Blackhead sheep (old type) – 950 female;
- Vištinės geese – 300 females.

Microsatellite panels for the routine parentage testing in three Lithuanian horse breeds: Žemaitukai, Heavy-type analyze Žemaitukai and Lithuanian Heavy Draught has been analyzed (Juras and Cothran, 2004) and a wide range of genetic markers and mitochondrial DNA sequencing were used to access genetic diversity in Žemaitukai horses (Juras and Cothran, 2005). Genetic differences and genetic variation of the large-type Žemaitukai horse population have been analyzed (Šveistienė, R. V. Jatkauskienė, 2006). The pedigree, gene frequencies of blood group and serum protein markers, homozygosity, and genetic similarities were analysed from 138 horses. Genetic variation and the temporal changes in intra- and interbreed EAB allele variation of Baltic countries' red (Estonian Red, Lithuanian Red and Latvian Brown) cattle breeds in the situation of inextensive breeding was estimated (Viinalass et al., 2002). The genetic diversity of Lithuania, Latvian and Estonian native cattle breeds on the basis of classical genetic markers are described. Milk protein polymorphism genetic variants of bovine milk proteins and polypeptide hormone prolactin were studied in two native cattle breeds – Lithuanian Light Grey and Lithuanian White Backed and in two modern cattle breeds – Lithuanian Black and White and Lithuanian Red – by polymerase chainreaction (Miceikiene et al., 2006). As Northern European indigenous cattle breeds are currently endangered and at a risk of becoming extinct, variation at 20 microsatellite loci in 23 indigenous, 3 old imported, and 9 modern commercial cattle breeds that are presently distributed in northern Europe have been analyzed (Tapio et al., 2006).

Waterfowl species-specific primers were used in order to detect polymorphism in Lithuanian native geese breeds (Vištinės, Skarulės and Vištinės-Skarulės hybrids – Native Mixed) and the white-fronted geese species (Baublys et al., 2006).

Agricultural plants, fruits and vegetables

In 2004 Plant Gene Bank http://www.agb.lt/index_en.htm with coordination centres of plant groups has been established. MoA delegated accumulation, investigation and preservation of national plant genetic resources to the Plant Gene Bank and coordination centres of plant groups. These are scientific and study institutions responsible for national plant genetics resources of according plant groups coordination, accumulation, investigation, preservation and use: agricultural plants – Institute of Agriculture; fruits and vegetables – Institute of Horticulture; forest trees – Forest Research Institute; ornamental plants – Vilnius University; medical plants – Institute of Botany

In order to investigate genetic material accumulated at the Lithuanian University of Agriculture and identify donors exhibiting economically valuable biological and morphological traits for breeding work, various varieties and forms of tomato, cucumber, carrot, red beet, onion, garlic, cabbage, haricot and non-widely cultivated vegetables were investigated (Bartkaitė et al., 2002). In situ conservation of medicinal plants and small fruits in Lithuania has been conducted (Labokas, 1999). In order to develop winter wheat varieties suitable for organic farming, the breeding lines developed at the Lithuanian Institute of Agriculture and winter wheat varieties registered in Lithuania were investigated in terms of resistance to common bunt (Liatukas & Ruzgas, 2005). Grain stability and malt quality characteristics of accessions from a spring barley genetic resources collection were investigated at the Lithuanian Institute of Agriculture (Leistrumaitė & Paplauskienė, 2005).

Forest trees and other plants

Researches on forest tree breeding zones delimitation in Lithuania (Danusevičius, 1998a), on conservation of plants genetic resources (Gabilavičius & Danusevičius, 1996; Danusevičius, 1998, Danusevičius & Gabilavičius, 1997; Pliūra & Eriksson, 1997; Pliūra et al., 1997; Danusevičius et al., 1999; Pliūra, 2000), on selection strategies (Danusevičius & Lindgren, 2002a,b, 2004) has been conducted in Lithuania. A model for optimisation of the long-term breeding population size was developed for the optimum allocation of resources between the breeding and testing populations (Danusevičius and Lindgren, 2005). Conservation in situ as one of the main methods of forest genetic resources conservation in Lithuania was discussed (Danusevičius & Gabilavičius, 1999); four strict forest genetic reserves, 203 genetic and 72 seed reserves were singled out. Guidelines on establishing, managing and use of in situ gene conservation areas (gene and seed reserves) of Norway spruce for foresters were elaborated (Pliūra, A. 1999b). EUFORGEN technical guidelines for genetic conservation and use for common ash (*Fraxinus excelsior*) have been prepared (Pliūra and Heuertz, 2003).

The random amplified polymorphic DNA (RAPD) method was used to examine genetic differences among three populations of *Pinus sylvestris* (Labanoras, Druskininkai-Veisiejai and Telšiai) situated in ecologically different environments (Naužemys et al., 2006). Selection of genotypes and gene conservation in seed orchards of Norway spruce has been conducted (Gabilavičius & Danusevičius, 2006). Reaction of progenies (seedlings) of different Scots pine (*Pinus sylvestris*) populations at the juvenile stage on new climatic and microclimatic conditions was investigated (Aučina et al., 2005). An assessment of genetic diversity in tree clones of *Pinus sylvestris* using RAPD markers has been performed (Žvingila et al., 2002). Phenotypic structure of oak stands was investigated (Baliuckas et al., 1997). Genetic variation and ecological sensitivity of *Quercus robur* populations (Baliuckas & Pliūra, 2003) and black alder (Pliūra & Kundrotas, 2002) have been studied. Multiple Population Breeding System (MPBS) concept in conservation of forest genetic resources is discussed (Pliūra, 1999a). As has been suggested by Baliuckas and Pliūra (1999), the MPBS would be applicable with high efficiency for conservation of oak in Lithuania. Baliuckas et al. (2004) discussed forest tree breeding strategies in Nordic and Baltic Countries and its possible implications on Lithuanian Tree Breeding Strategy. Lithuanian and Swedish silver birch (*Betula pendula*) populations were studied for wood hardness by using 6 J Pilodyn measurements (Baliuckienė & Baliuckas 2006). Within and among population variation in juvenile growth rhythm and growth in *Fraxinus excelsior* and *Prunus avium* has been studied (Baliuckas et al., 2000). Randomly amplified polymorphic DNA (RAPD) analysis was used to examine the genetic diversity and structure of ten natural Lithuanian common ash (*Fraxinus excelsior*) populations (Žvingila et al., 2005). Age related dynamics of genotypic, phenotypic, and environmental variation, clonal repeatability, and genotypic correlations for wood density and its intra-ring components, various shrinkages and genotypic variation in wood density and growth traits were analysed in four poplar hybrid crosses (Pliūra et al., 2005, 2006, 2007).

Plant diversity in situ research in the global and regional context as well as ecosystem pool conception were discussed (Motiekaitytė, 2006). Medicinal and Aromatic Plant working group (MAP) is one of the crop-specific working groups within the framework of National Plant Genetic Resource conservation programme (Radušienė & Vaičiūnienė, 1999) The active conservation of MAP includes in situ and ex situ methods. Genetic characteristics of morphologically different wild cranberries (*Vaccinium oxycoccus*) from Čepkeliai reserve using random amplified polymorphic DNA (RAPD) analysis have been studied (Areškevičiūtė, et al. 2006). Adaptive variability was studied in twenty accessions of *Rubus idaeus* by RAPD and SOD isozyme polymorphism methods (Žvingila et al., 2004). Genetic diversity of *Rubus idaeus*, both within and among the populations in different ecological conditions was compared (Patamsytė et al., 2005). The diversity of RAPD markers was studied in 136 plants of the wild raspberry from seven populations sampled in Lithuania. Experiments with 25 accessions of red fescue (*Festuca rubra*) were carried out at the Lithuanian Institute of Agriculture in Dotnuva (Tarakanovas & Kanapeckas, 2005). Dry matter content in overground biomass in six varieties and four breeding populations of white clover (*Trifolium repens*) were studied at the Lithuanian Institute of Agriculture (Tarakanovas & Sprainaitis, 2005).

Selected research projects related to genetic diversity

Institute of Biotechnology (<http://www.ibt.lt/>):

- ESF: “Žmonių išteklių kokybės gerinimas žemės ir miškų ūkio biotechnologinių tyrimų srityje” [Improving human resources in the field of biotechnological research in agriculture and forestry] (2005-2007)
- SPD priority 2: “Žmogiškųjų išteklių plėtra” [“Development of human resources”] <http://www.esparama.lt/en/>
- SPD priority 5: “Žmonių išteklių kokybės gerinimas mokslinių tyrimų ir inovacijų srityje” [“Increasing human resource quality in the field of scientific research and innovations”].
- SPD activity area: “Mokslininkų ir kitų tyrėjų kvalifikacijos kėlimas žemės ir miškų ūkio augalų biotechnologijos srityje” [“Improving qualification of scientists and other researchers in the field of biotechnological research in agricultural and forestry plants”]. The project partners: Lithuanian Institute of Agriculture; Lithuanian Institute of Horticulture, Lithuanian Forest Research Institute, and Lithuanian University of Agriculture.

Lithuanian Institute of Horticulture (www.lsdil.lt/):

- COST 851 activity “Gamete Cells and Molecular Selection for Plant Improvement”. (2001-2006);
- COST 863 activity “Scientific Investigations of European Berry Growing: from Genomic to Preservable, Qualitative and Health Production” (2005-2009).

Lithuanian Forest Research Institute (<http://www.mi.lt/mokspadaliniai.htm>):

- COST E28. Genosilva: European Forest Genomics Network (2001-2006)
- COST 851. Gametic cells and molecular breeding for crop improvement (2001-2006)

Institute of Botany (<http://www.botanika.lt/>):

- FP5 project "European Crop Wild Relative Diversity Assessment and Conservation Forum (PGR Forum)" (duration 2002–2005) www.pgrforum.org

Conclusions

1. During the last few years, activities related biodiversity protection and landscape conservation in Lithuania have considerably increased. Public agriculture and rural development policy is being set out in strategic agricultural and rural development documents including SPR. The main general objective of SPR is the implementation of the principles and measures of the EU CAP. More specifically, the two environmental

Directives, Dir.79/409/EEC on the conservation of wild birds and Dir. 92/43/EEC on the conservation of natural habitats and of wild flora and fauna, form the legal basis for a network Natura 2000. Since almost all sites of the network have been selected on the basis of scientific data, these are most important Lithuanian' biodiversity research that directly contribute to sustainable use of biodiversity in Europe.

2. Important step to sustainable use of biodiversity is implementation of programme on Woodland Key Habitat Inventories (WKHI) of state, private and reserved for privatisation forests in Lithuania (2002-2005). As mapping of Woodland Key Habitats is required by forest certification schemes they provide a tool for maintaining a large share of forest biodiversity in a cost-effective way.
3. Investigations of genetic diversity of crop varieties, livestock breeds and races, and of commercial tree species and promotion their in situ conservation have created a good theoretical and empirical basis that can play an important role in protection of nature and biodiversity too.
4. Important constraints for Lithuania concerning the sustainable use of biodiversity are still exist:
 - insufficient co-operation between agriculture and environmental administration;
 - insufficient political will to realize a higher priority of biodiversity conservation;
 - low level of environmental awareness leading to threats to biodiversity as land-reclamation, intensification of forest felling, loss of meadows due to abandonment or change of agricultural activities.

List of acronyms

BDSAP	Biodiversity Strategy and Action Plan
CAP	Common Agricultural Policy
EAGGF	European Agricultural Guidance and Guarantee Fund
LFN	Lithuanian Fund for Nature
MoA	Ministry of Agriculture of the Republic of Lithuania
MoE	Ministry of Environment of the Republic of Lithuania
RDP	National Rural Development Plan (2004-2006)
SAPARD	Special Accession Programme for Agriculture and Rural Development
SPR	National Strategy Plan for Rural Development (2007-2013)
SPAs	Special Protected Areas
SPIs	Sites of Community Importance
SPD	Single Programming Document

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Useful links:

Association of Lithuanian State Parks and Reserves (ALSPR)

<http://www.parkai.lt/show/en/links.html>

Environmental Information Centre <http://www.apicentras.lt/?pid=85>

Environmental Protection Agency <http://aaa.am.lt/VI/index.php#r/1544>

Faculty of Environment Engineering Department of Environment Protection of Vilnius Gediminas Technical University

http://www.aak.ap.vgtu.lt/?did=3575&page=DARBUOTOJO_CV

Institute of Animal Science of Lithuanian Veterinary Academy <http://www.lgi.lt/>

Institute of Biotechnology <http://www.ibt.lt/>

Institute of Botany <http://www.botanika.lt/>

Institute of Ecology of Vilnius University <http://www.ekoi.lt/lit/>

Institute of Environment of Lithuanian University of Agriculture <http://ai.lzuu.lt/main.php?cat=1>

Institute of Geology and Geography <http://www.geo.lt/>

Kaunas University of Technology

http://www.ktu.lt/lit/apie_struktura/fakultetai/chem/inzeko_kat/str.asp

Lithuanian Agricultural Advisory Service <http://www.lzukt.lt/english/default.asp>

Lithuanian Association of Forest Owners <http://www.ibt.lt/>

Lithuanian Forest Inventory and Management Institute <http://www.lvmi.lt/>

Lithuanian Forest Research Institute <http://www.mi.lt/mokspadaliniai.htm>; publications by the scientists of the Lithuanian Forest Research Institute on genetic studies, conservation of forest genetic resources, and tree breeding

<http://www.forestgen.mi.lt/content/Genpublikacijos.htm>

Lithuanian Fund for Nature <http://www.glis.lt/>

Lithuanian Institute of Agrarian Economics (LIAE) <http://www.laei.lt/>

Lithuanian Institute of Agriculture <http://www.lzi.lt/>

Lithuanian Institute of Horticulture www.lski.lt

Lithuanian Ornithological Society <http://www.birdlife.lt/>

Lithuanian University of Agriculture <http://www.lzuu.lt/m/1>

Ministry of Agriculture of Republic of Lithuania

http://www.zum.lt/min/index.cfm?fuseaction=displayHTML&file=File_202.cfm&langparam=EN

Ministry of Environment of Republic of Lithuania <http://www.am.lt/VI/en/VI/index.php>

Nature Heritage Fund <http://www.wetlands.lt/>

Natura 2000 project Natura 2000 in Lithuania http://www.am.lt/natura2000/en/projektai_2.php

Regional Environmental Center for Central and Eastern Europe (REC Lithuania) www.rec.lt

State Forest Survey Service http://www.lvmi.lt/vmt/at_b_inf.php

State Service for the Protected Areas under the Ministry of Environment

http://vstt.lt/wt_vstt/action/load?url=html&id=77

Station of Nature Research and Ecological Education <http://www.sesupe.org/index.html>

Vilnius Pedagogical University <http://www.vpu.lt/>

Vilnius University <http://www.vu.lt/lit/>

Vytautas Magnus University <http://www.vdu.lt/>

Water Management Institute of Lithuanian University of Agriculture <http://www.waterland.lt/>