Agrobiodiversity in Southeast Europe - Assessment and Policy Recommendations

COUNTRY REPORT - ALBANIA

South Eastern Europe SWG RRD Regional Rural Development Standing Working Group

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LIST OF ABBREVIATIONS

ABS Nagoya Protocol	Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits
AIFIS	Information System for Albanian Forests
AIPS	Albania's Integrated Planning System
ALBAGENE	National Association for Conservation and Use of Farm Animal Genetic Resources
AnGR	Animal Genetic Resources
APGR	Association for Plant Genetic Resources
ARI	Agricultural Research Institute
ATTC	Agricultural Technology Transfer Centres
AU	Agricultural University
AUT	Agricultural University of Tirana
BLEKALB	Foundation – Science, Technology and Extension Service for Farm Development
CABRA	Conservation of Agrobiodiversity in Rural Areas of Albania
CATT	Centre for Agriculture Technology Transfer
CBD	Convention on Biological Diversity
CPF	Country Programming Framework
CWR	Crop Wild Relatives
DALP	Directorate of Agricultural and Livestock Production
DBPA	Directorate of Biodiversity and Protected Areas
EC	European Commission
ECPGR	The European Cooperative Programme for Plant Genetic Resources
FAO	Food and Agriculture Organization
FFEM	French Fund for World Environment
FSVI	Food Safety and Veterinary Institute
FTRI	Fruit Tree Research Institute
GDAP	General Directory of Agricultural Policies
GEF	Global Environmental Facility
GoA	Government of Albania
IBB	Biologic Agriculture Institute
IBPGR	International Board for Plant Genetic Resources
IBRD	International Bank for Reconstruction and Development
IFSV	Institute for Food Security and Veterinary

INCA	Institute for Nature Conservation in Albania
INSTAT	Institute of Statistics
IPA	Instrument for Pre Accession Assistance
IPARD	Instrument for Pre Accession Assistance for Rural Development
IPGR	Institute of Plant Genetic Resources
IPGRI	International Plant Genetic Resources Institute
IPK	Institute of Plant Genetics and Crop Plant Research
LEA	National Breeders' Association
LR	Landrace
MADA	Mountain Areas Development Agency
MAP	Medicinal and Aromatic Plants
MARD	Ministry of Agriculture and Rural Development
MoAFRD	Ministry of Agriculture, Food and Rural Development
MM	Ministria e Mjedisit (Ministry of Environment)
MRI	Maize and Rice Institute
MTE	Ministry of Tourism and Environment
NAPA	National Agency of Protected Areas
NASR	National Association for Small Ruminant
NGO	Non Governmetal Organization
NSDI I	National Strategy for Development and Integration
OAA	Organic Agriculture Association
PGR	Plant Genetic Resources
PGRFA	Plant genetic resources for food and agriculture
PNUD/PNUD	United Nation Development Program
PPNEA	Protection and Preservation of Natural Environment in Albania
RASP	Rural Association Support Program
REC	Regional Environment Center
SAVE	Saveguard for Agricultural Varietes in Europe
SHFBI	Small Ruminants' Breeders' Association
SIDA	Swedish International Development Cooperation Agency
SISS	State Institute for Seed and Saplings
SNAPARD	Strategic National Plan for Agriculture and Rural Development
SRS	Small Ruminant Station
UNDP	United National Development Programme
UPOV	Union for the Protection of New Varieties of Plants
VPRI	Vegetables and Potato Research Institute
ZMDB	Zona të Mbrojtura Detare dhe Bregdetare (Marine and coastal protected area)

FOREWORD
AND ACKNOWLEDGMENTS

The three-year project "Rural Development through Integrated Forest and Water Resource Management in Southeast Europe (LEIWW)" is jointly implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Standing Working Group for Regional Rural Development (SWG RRD).

The project aims to improve the regional capacities for sustainable management of natural resources for the development of rural areas of Southeast European countries: Albania, Bosnia and Herzegovina, Kosovo*, Macedonia, Montenegro and Serbia.

As part of the EU (pre-) accession process, the countries of Southeast Europe (SEE) are committed to the harmonisation of their strategies, policies and legislation with the acquis communautaire of the EU and to build the conditions and capacities for their implementation.

Therefore, one of the main objectives of the LEIWW project is to create preconditions for evidence-based, EU-compliant policy formulation regarding the conservation and sustainable use of genetic resources in agriculture (agrobiodiversity). Agrobiodiversity is essential for the sustainable development of agricultural production, nature conservation and adaptation to climate change, as well as for the welfare of the people living in rural areas.

In line with this objective, evidence-based policy assessments and gap analysis related to agrobiodiversity were performed in a regional process involving leading experts and institutions of all SEE countries and entities aiming to identify priorities and to formulate recommendations for mainstreaming agrobiodiversity in agriculture and rural development policies, strategic plans, programmes and relevant legislations.

On this occasion, SWG and GIZ would like to express our appreciation to the Ministries of Agriculture and Rural Development from the SEE region for their dedication and active contribution to the process.

The appreciation particularly includes the regional coordinators Prof. Sonja Ivanovska and Prof. Sreten Andonov from the Faculty of Agricultural Sciences and Food, St. Cyril and Methodius Universityof Skopje, all participating experts and institutions, as well as the team of international experts from the Environment Agency Austria (Umweltbundesamt, GmbH).

The coordination of the process by Ms. Irena Djimrevska, GIZ and Ms. Katerina Spasovska, SWG, as well as the technical assistance of Ms. Jana Vasilevska, GIZ and Mr. Oliver Pop Arsov, SWG is highly acknowledged.

We would like to thank you all for having contributed to this major work!

On behalf of the SWG Secretariat
Mr. Boban Ilic
Secretary General

On behalf of GIZ LEIWW
Mr. Benjamin Mohr
Team Leader

INTRODUCTION

Southeast European (SEE) countries are rich in agrobiodiversity. Farming systems are built on a broad range of divergent local and autochthonous plant varieties and animal breeds of international importance. In times of ecological and economic pressure the treasure of diversity is at risk, distinction is irreversible and hinders today's and tomorrow's welfare, resilience and adaptive capacity. Strong links between agrobiodiversity, traditional knowledge, cultural diversity and local innovations are evident in the region and are part of its unique and rich character. In contrast to the developed countries, often less rich in agrobiodiversity, but equipped with strong policies for supporting preservation, sustainable use and promotion of genetic resources, Southeast European countries still struggle to establish an adequate framework for conservation and sustainable use of plant and animal genetic resources.

Moreover, the public, political and scientific awareness on the essential role of agrobiodiversity is on very different, mostly low levels, followed by (in-)different legislative, low institutional and financial support. Finally, all countries of SEE are facing two strong factors leading to inevitable loss of the still existing valuable genetic resources in agriculture: aging and migration of the rural population.

Conservation and sustainable use of genetic resources in agriculture are essential for the sustainable development of agricultural production, food security, adaptation to climate change, as well as for the socio-economic development and welfare of rural areas. Strong international governance structures, such as the Convention for Biodiversity (CBD) are in place, while the EU countries developed support mechanisms for safe-guarding agrobiodiversity. The SEE region, however, is lagging behind in defining and implementing support policies for conservation and sustainable use of its -still rich- agrobiodiversity.

National and regional policy assessments and gap analysis have been conducted in a process in ownership of the SEE countries (Albania, Bosnia and Herzegovina, Kosovo*, Macedonia, Montenegro and Serbia) in order to provide recommendations for EU compliant policy development relevant for the conservation and sustainable use of agrobiodiversity.

The assessment focuses on an analysis of the current national legislative and institutional status, trends of agrobiodiversity and its protection in the SEE countries. They also focus on identification of gaps, highlighting the necessary changes, reforms and harmonization of the legal base in respect to the Common Agricultural Policy (CAP), NATURA 2000, EU Biodiversity Strategy and Biodiversity Action Plan for Agriculture, Global Plan of Action for Plant Genetic Resources, Global Plan of Action for Animal Genetic Resources and Convention for Biodiversity (CBD).

Key problems and challenges requiring policy interventions are identified, and policy recommendations that will assist the EU integration process of the candidate and potential candidate countries are formulated and disseminated.

The work has raised awareness regarding the importance of agrobiodiversity in the SEE countries, in particular regarding the incentives for conservation and adding value to agrobiodiversity in order to enhance the rural welfare thus maintaining traditions, passing on the local knowledge and ensuring food security.

The assessments, gap analysis and policy recommendations were prepared by academic experts (one for animal genetic resources and one for plant genetic resources from each of the SEE

countries/entities), in cooperation with representatives of the respective Ministries of Agriculture and Rural Development, and coordinated by a team of experts from the Faculty of Agricultural Sciences and Food at the St. Cyril and Methodius University in Skopje.

Considering that the agrobiodiversity heritage of the SEE countries is without boundaries, shared, or mutually owned, while the EU accession process represents a common framework for the whole region, the issue of agrobiodiversity affects not only the national levels of each SEE country, but also touches upon the aspects of regional coordination and cooperation. Key challenges and reform priorities at regional level are presented in the Regional Synthesis Report prepared by the Environment Agency Austria, in their position as international backstopping institution.

The assessments were performed in the period between June 2017 and April 2018, through a process of research, consultations, peer learning and networking, both on national and regional level. During this period of time, four coordinative regional working meetings of the experts and Ministries were held.

All the information presented here are as of December 2017.

**This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence*

1. SOCIO-ECONOMIC, INSTITUTIONAL AND LEGISLATIVE CONTEXT

1.1. GEOGRAPHICAL AND POLITICAL CONTEXT

Albania is a small European country covering an area of 28,748 square kilometers, and with a population of 2.87 million of inhabitants. It is located in the south-western part of the Balkan peninsula, bordered by Montenegro to the northwest, Kosovo* to the northeast, the Republic of Macedonia to the east, and Greece to the south and southeast. The country has a coastline on the northern shore of the Mediterranean Sea, the Adriatic Sea to the west and the Ionian Sea to the southwest where the Albanian Riviera begins. Albania is less than 72 km (45 miles) from Italy, across the Strait of Otranto which connects the Adriatic Sea to the Ionian Sea.

Albania's boundary is 1,094 km long in total, out of which 316 km borders along the sea, with a 73 km long lake border, 48 km long river-banks border, and 657 km long land border.

According to the Institute of Statistics (INSTAT), as of 1st January 2017, the population of Albania is 2,876,591. The fall of the Communist regime in Albania in 1990 was followed by massive migration. Between 1991 and 2004, roughly 900,000 people migrated from Albania, about 600,000 of which settled in Greece. Migration greatly affected Albania's internal population distribution. The population decreased mainly in the North and South of the country while it increased in the Tirana and Durrësi districts of the country.

Albania is divided into 12 administrative counties (*Qark or Prefektura*). Since June 2015, these counties have been divided into 61 municipalities (*Bashkia*).

The process of transformation from a centralized economy to an open market economy that is based on private property has developed intensively in Albania. The formal non-agricultural employment in the private sector more than doubled between 1999 and 2015 with much of this expansion powered by public and foreign investment and self-employment initiatives. Standing at 14.7% (2016), Albania has the 4th lowest unemployment rate in the Balkans. Albania's largest trading partners are Italy, Greece, China, Spain, Kosovo*, and the United States.

In 2015, Albania's GDP (current price) and GDP/capita, was, respectively, 10.218 billion euro and 3,547 euro.

The ratio of import/export in 2016 was evaluate to 2, 4 : 1. Foreign trade contribution is estimated at about 62.3% of GDP. Textile and footwear are goods that have been imported more, approximately 43.8 % of total export goods, while food, beverages, and tobacco comprise up to 10.4% of the total export of goods. The export of fruit and vegetables has doubled over the first months of 2017. The export of fish, seafood, and marine products has also increased (35%).

Although agriculture is no longer the dominant sector of the Albanian economy, it still contributes to approximately 22% to the GDP. The government considers the agricultural sector to be of crucial importance for Albania's economic development and hopes to boost agricultural production by providing financial support to farmers and facilitating private investment in the agro-processing sector. The government has allotted, over the last five years, on average $10 US million annually

to develop fruit and olive orchards, vineyards, greenhouses, and storage capacities as a direct support for rural development.

The Republic of Albania has been an official candidate for accession to the European Union since June 2014. Officially recognized by the EU as a "potential candidate country" in 2000, Albania started negotiations on a Stabilization and Association Agreement (SAA) in 2003.

Albania's Integrated Planning System (AIPS) was compiled in 2006. This document elaborated on the different aspects of policy, planning, and budgeting processes in Albania, that are part of the three principal components:

- The national and sectoral strategies process providing guidance to high level policy making.
- The European Integration process, describing planning arrangements and resource requirements for achieving objectives under the European Integration agenda.
- The medium -term budget process.

After being granted the status of EU candidate country in June 2014, Albania has since made progress in the area of EU approximation, specifically in these following steps:

- Based on the Albanian National Strategy for Development and Integration, 2007-2013, (NSDI I), the NSDI II was elaborated upon for 2014-2020. In this strategy a strong focus is placed on the sustainability element related to management of natural resources, promoting diversified economic activity and also strengthening capacities to improve living conditions. The strategy also promotes the improvement of innovative techniques referring to agricultural products, by delivering different competencies to the responsible authorities. The strategic priority of the NSDI II (2014-2020) is to contribute to a fair development of all rural regions in Albania, to improve the quality of life in Albania's rural area in a sustainable way and reduce poverty among the rural population.
- The crosscutting Inter-sector Strategy for Agriculture and Rural Development (ISARD) 2014-2020, was adopted. This document provides the legal basis for the national support schemes, which are set out in the Strategic National Action Plan for Agriculture and Rural Development (SNAPARD).

The implementation of the Strategic Plan for Agriculture and Rural Development contributes to the achievement of strategic national goals through: (i) support of economic growth in accordance with the principles of sustainable development, (ii) increasing the human resource potential, (iii) raising incomes through new job creation, and (iv) improved social inclusion to ensure a better quality of life.

The first phase of ISARD 2014-2020, which consists of starting the IPARD II Program, is progressing. The IPARD II Program was adopted by the Government of Albania (GoA) and approved by the European Commission (EC) in July 2015 and ratified by the Albanian Parliament in March 2016. The implementation of the IPARD II Program is foreseen to start at first part of 2018.

The budgetary support to agriculture in Albania is modest when compared to the agriculture sector's size, needs, and contribution to the national economy. Although the budgetary support for 2015 was higher than in previous years, still its share was only 1.7% of agriculture gross value added. This figure is low considering the contribution of the agriculture to overall GDP, which is anchoring at around 20% (21.7% in 2015). 2015 was marked not only by an increase in the overall budgetary support but also with a change in its composition. The support for infrastructural and rural development have increased, receiving 61% of the overall support funds (up from 39% in

2014). Support of large-scale agricultural productions maintained the second position receiving 24% (down from 50% in 2014). The financial support of small-holders, accounted for 15% of the overall budgetary expenditures (up from 11% in 2014). Recently, farmers' support has been gaining importance in Albania. However, it is still much lower when compared to other Western Balkan countries. The entire funding for infrastructural and rural development measures, with the value of 21.3 million euro in 2015, is designed to improve the competitiveness of the agro-food sector. Among infrastructural and rural development support measures the largest share of funds belongs to the financing of drainage, irrigation and other water resource management infrastructures (in 2010-2015, 60% on average).

Since 2007, the EU through the Instrument for Pre-accession Assistance (IPA) has supported Albania in order to fully prepare the country to take on the obligations of membership in the EU. A lack of access to finance is a key barrier to the growth of Agricultural SME enterprises. Research shows that reasons for the low levels of agribusiness financing are closely interlinked to both the supply and demand side of stakeholders. Much progress has been made in narrowing this gap, but achieving the vision of total access by 2020 will require a holistic effort by the Government, EU bodies, innovative business models, and close collaboration between the private and public sectors, experts and agro-financing consulting organizations, transferring expertise for greater agro-development impact. 92 million euro will be the European Union's financial support for agriculture and rural development for the period 2014-2020. The objectives of this support will be the improvement of competitiveness in the agriculture sector, agro-processing industry, and rural development.

The agricultural policy is of multi-dimensional importance, from meeting the EU standards related to food security and agricultural practices to preparing the agricultural sector to withstand the competitive pressures of the upcoming membership in the single market. That implies that Albania's agricultural policy should comply with the EU's CAP in order to achieve economically viable farming, improved food security, and sustainable rural livelihood. As such, this emerging political set-up requires a new vision for policymaking as well as a new approach for designing the budgetary support measures for the agricultural sector.

1.2. AGRICULTURAL PRODUCTION

The total land in Albania amounts to 2,875,000 ha, from which, 699,000 ha or 24% is agricultural land (excluding permanent pastures), 36% forestry, 16% permanent pastures, and 24% others. About 43.3% of agricultural land is situated in lowland areas, 34% in the hill area (and about 22.7 % in the mountainous regions. Only 50% of agricultural land is used as arable land and garden (603,000 ha), by which 413,000 ha are sown areas and the rest are fallow and other arable land. The agricultural land situated higher than 300 m above sea level is very fragmented, with limited potential for irrigation, and is under the permanent threat of erosion.

Albania can be divided into three agro-ecological areas, based on soil, climatic, topographic, and socio-economic features including access to agricultural services and inputs, and development of markets and infrastructure. Each of these areas will be impacted upon differently by climate change due to variations in climate, biophysical distinctions, and production systems:

a. Mountain Area: 1000-2700 m above sea level, dominated by pastures and forests.
b. Hill Area: 400-1000 m above sea level: Field crops and fruit trees are grown extensively throughout this region.
c. Lowland Area: 0-200 m above sea level: Field crops (wheat, field and greenhouse

vegetables, maize, beans), fodder crops, and citrus, figs, olive trees and grapevine are grown here.

With respect to the area of agricultural land for each habitant, Albania is ranked as the last in the region (about 2,200 m² / habitant). The agricultural household in Albania, on average, consists of about 4.8 persons. Over the last 20 years the specific weight of agriculture in the GDP structure has decreased from 45% up to 22.4% in 2016. Nevertheless, it must be emphasized that the decline in global terms is not characteristic of the rhythms of agricultural production development itself. So, average annual growth of agriculture during the last ten years is estimated to be between 3.5-4.0%. The growth of the agricultural sector is below the national average. Nevertheless, it is important to note that agriculture is the sector of the national economy with huge reserves to develop much more.

The transformation of the economic system that took place in the early `90's and the total privatization of agricultural land resulted in the fragmentation of the agricultural economy. Small family farms of about 1-1.5 ha agricultural land are predominant. Nevertheless, over the past few years the number of middle and large scale farms has increased. In particular, in the coastal area region investments for setting up large, commercial farms for the production of dairy milk, pork meat, eggs, and poultry meat are increasing.

The characteristic of the agricultural households in Albania is the predominance of family labor. About 90% of the farms satisfy their job needs from their family. Only about 10% of farms satisfy their job needs from hired workers. The agricultural farm is one of the most important employment opportunities for population in rural areas. 73% of the work force in these areas is employed in agriculture, 6% in agro-industrial activities, and 3% in other jobs; however, it ought to be emphasized that the category of 16-30 year old has very little connections with the agricultural farms. Only 45% of young people work on farms. The educational level of the active population in rural areas is low. Statistical data from 2016 shows that about 59% of farmers received elementary education and only about 33% finished high school. Only about 38% received an agricultural professional education.

Three production systems are applied in Albania:

- *Low input production system (extensive)* - This is the most frequent system in Albania. This situation is conditioned by the predominance of small-scale family farms, where the majority of them are characterized by the management of a few different plant varieties and animal species, and a small number of animals. The main purpose of productive activities in these farms is the production of agricultural and livestock products to meet the family's food needs. The characteristic of this system is the management of local breeds especially, sheep, goats and poultry.
- *Medium input production system (semi intensive)* - This system is actually applied in 12% of farms, which raise cattle, 30% of pig farms, 20% poultry farms, 5% sheep farms, and 15% of turkey farms. Characteristics are investments for housing, feeding and veterinary services for animals as well as implementing knowledge concerning the various techniques and technologies of production.
- *Intensive production system* - This system is actually applied in the industrial complexes of egg production and meat production from poultry and pigs. Commercial farms for meat production from fattening calves, pigs, and turkey mainly apply this system.

In the agricultural production structure, crop and fruit production are 44% and 11% respectively, while livestock production accounts for almost half the total agricultural production. The main

agricultural products are cereals (especially wheat), vegetables, potatoes and beans (37%). Forage crops (maize and alfalfa) are cultivated on about 49% of total farm surface area (Annex 1).

Albanian agricultural products are destined for the domestic market. Exports are limited and only a small number of products such as vegetables, fruits, eggs etc. are exported. Domestic production does not meet the food needs of population. Even when domestic products are sufficient, the same imported product is often found on the market. In response to the conditions that have arisen from the global economy and free market in the agricultural production, there are trends for the traditional agriculture development chiefly supported upon the use of the autochthonous plant and animal genetic resources and the agro-traditional systems of production.

Over the next ten years, the priorities of Albanian government will include the following:

- Support fruit-tree growing and vineyards as important priorities of agriculture development;
- Support vegetable production, which, although has recorded noticeable increase, is still insufficient in respect to consumption and market demands;
- Support for increasing livestock production.

1.3. INSTITUTIONAL AND ADMINISTRATIVE SET UP

The Ministry of Agriculture and Rural Development-MARD (*before the parliamentary election, June, 2017, known as the Ministry of Agriculture, Rural Development and Water Administration-MARDWA*), is the national authority for the conservation and sustainable use of Plant and Animal genetic resources for agriculture and food. There is the General Directory of Agricultural Policies (GDAP), which prepares regulations focusing on conservation and management of Agro-biodiversity, that legally encourage support for autochthonous plants according to typical cultivation areas, certified "BIO" products, cultivated medicinal plants, etc. The coordination and supervision of actions concerning genetic resources in agriculture, such as activities for "on-farm" conservation and using of PGR have to be directed through the Directorate of Agricultural and Livestock Production (DALP), but their activities are mainly focused on seed issues, mainly for seed varieties that are used for agricultural production, and on maintaining the National List of Varieties. To fulfill its responsibility there has been a national network of agricultural research institutions, which in 2006 were reorganized in the form of centers for the transfer of agricultural technologies. This reorganization of national network it is not sufficiently efficient in the protection of agro-biodiversity, especially for PGR. For the fulfillment of the responsibilities related to AnGR, ten years ago the Ministry of Agriculture, with the technical support of the FAO established the National Network for AnGR conservation, management and sustainable use. This Network was led by the National Coordinator of AnGR. A network was extended to the whole country, in 12 regions. In each region, the network was headed by a regional coordinator. The regional coordinator was responsible for coordinating the work among the different stakeholders, farmers, animal production specialists, and IA operators.

Actually, at the regional level there are Regional Directorates of Agriculture and Food, Extension Service and Public Veterinary Service structures, laid up to the level of the units of local governing. These are the public institutions that have the responsibilities to support and collaborate with other stakeholders for the implementation of the programs and projects in the fields of conservation and sustainable use of PGR and AnGR.

Ministry of Tourism and Environment (MTE), is responsible institution for the creation of policy and legal documents and their implementation. It is a national authority for conservation and sustainable use of biodiversity, protected areas, protection of nature, sustainable development and management of forestry and pastures, etc. It establishes the main goals for biodiversity protection, prepares programs and strategies for their implementation, establishes new regulations in this field and coordinates the implementation of the National Strategy. All activities have to be directed through the Directorate of Biodiversity and Protected Areas (DBPA), but their activities are mainly focused on wild flora and fauna. MTE cooperates with the MARD regarding agro-biodiversity.

Research institutions

At the beginning of the `90's, Albania had 18 Agricultural Research Institutes (ARIs). The total staff number was 4,650 with 342 of them being researchers. These institutes possessed rich genetic material (seeds, saplings, semen, etc) and many other assets like land properties, buildings, laboratories, agricultural machineries, etc.

In 1998, with the support of USAID and technical assistance from Mississippi State University, a plant genetic bank was set up under the umbrella of the National Institute of Seeds and Saplings. They provided the equipment, installation and testing of infrastructure according to GeneBank standards. At the same time they trained the technical staff to qualify their skills for meeting criteria related to seed treatment protocols, storage and evaluation of the genetic material. In the period 1998-2001, the agricultural research institutes donated to the Gene bank the accession samples of their collections. This was the initial fund of collections, because later, year after year, the fund increased considerably in the number of accessions and species, thanks to numerous field collection missions. In its beginnings, the Albanian GeneBank has had the consultancy and support of the renowned international expert, Professor Karl Hammer.

Restructuring processes and reorganization of ARIs initiated after this period have been slow, often without precise objectives and priorities compared with the development stage. However, during this period the number of ARIs has been reduced by 50%. In the middle of 2006, MARD (at the time known as the Ministry of Agriculture, Food and Consumer Protection-MAF&CP) had under its umbrella nine ARIs (five of which were based in Tirana, and four others in different regions) with 700 employees.

In the framework of the scientific research restructuring on a country level, MARD developed a new reorganization scheme of Agricultural Research Institutes under its administration. By Governmental Decision No 515, date 19.07. 2006 For the restructuring of research institutes under MAF&CP, MAF&CP established five Agricultural Technology Transfer Centers (ATTCs) and one Institute, named the 'Food Safety and Veterinary Institute (FSVI)-Tirana'. The Plant Genetic Bank was separated from the National Seed and Sapling Institute and was placed under the authority of the Agricultural University of Tirana (AUT).

The Institute of Plant Genetic Resources (IPGR). Actually, IPGR is an important part of the Agricultural University of Tirana, at the Faculty level. It is the leading research institution in the area of plant genetic resources. IPGR (including GeneBank) have 16 employees, out of which 11 hold Ph.D.'s. The institute have trial fields, various laboratories for phenotypic, agronomic and qualitative PGR analysis, laboratory of "in-vitro", inventory collection of seed samples, 16 vertical freezers for long-term storage condition of seed collections (-18°C to -20°C), cold chambers (0-5°C) of active seed collections, greenhouses, and ten ha of field collections of fruit trees, etc.

Some of its main tasks in the field of conservation and use of agro-biodiversity are:

a. Inventorying, collecting, regeneration, multiplication, characterization, evaluation, documenting and conserving of PGR;
b. Research projects for sustainable use of PGR;
c. Education with a course programs on PGR at undergraduate and postgraduate level, elaboration of M.Sc. and Ph.D. thesis on PGR;
d. Contributions to policymakers for the preparation of legal acts, participation in creation and implementation of governmental policy on PGR, participation in elaboration of strategy documents (studies, strategies, programs and action plans on biodiversity), etc.

To improve coordination of activities of different organizations involved into preservation of plant genetic resources the Coordination Council on Plant Genetic Resources for Food and Agriculture was founded in March 2016.

Agricultural high schools. The Agricultural University of Tirana and Agricultural University of Korça are public educational institutions where specialists are prepared. These institutions are involved in scientific research in the field of genetic resources of plants (PGR) and animals (AnGR).

Institute of Food Security and Veterinary (IFSV) and Agricultural Technology Transfer Centers (ATTCs) of Fushe Kruje, Korcha, Lushnja, Shkodra and Vlora are public institutions that have the responsibility to cooperate with the national network for the conservation and sustainable use of PGR and AnGR.

National Agency of Protected Areas in Albania (NAPA), part of the Ministry of Tourism and Environment (MTE), is a public institution that has the duties to manage, protect, develop, expand and operate the protected areas in Albania, which today account for about 16% of the territory of Albania. NAPA manages the network of protected areas and other natural networks as Natura2000, under management plans.

In order to carry out their duties and responsibilities these institutions, with the exception of public funding, cooperate with different institutions, agencies and various international organizations.

1.4. NON-GOVERNMENTAL SET-UP

Non-governmental and non-profit associations: Association for Plant Genetic Resources (APGR), National Breeders' Association (LEA), National Association of AI Operators, BLEKALB Foundation – Science, Technology and Extension Service for Farms Development, Small Ruminants Breeders' Association (SHFBI), Rural Association Support Program (RASP), Organic Agriculture Association (OAA), Biologic Agriculture Institute (IBB), Regional Environment Center (REC), Protection and Preservation of Natural Environment in Albania (PPNEA), Protection and Preservation of Natural Environment in Albania (PPNEA), Institute for Nature Conservation in Albania (INCA) etc. are active players in the treatment of issues for PGR and AnGR conservation and sustainable use.

The main financial source for these organizations are grants awarded by various international institutions such as GEF / UNDP, the World Bank, etc. and in the framework of bilateral cooperation through various agencies such as GIZ-Albania, the Swedish International Development Agency (SIDA), the Turkish Agency for International Cooperation (TIKA), etc. NGOs are also financially supported by the Albanian government funds for civil society organizations. The annual amount of

this fund is very low, almost to the point of being merely symbolic.

LEA, ALBAGENE, APGR, BLEKLAB Foundation, OAA, IBB and RASP are the most active organizations in the conservation and sustainable use of PGR and AnGR.

In general, Albanian farmers do not consider it worthwhile or beneficial to be organized in producer associations, collectors and processors of livestock products or breed societies. Such initiatives have always been hasty and have been realized only in the frame of projects that did not require co-financing with farmers. Consequently, the continuity and sustainability of these initiatives is conditioned only by the funds that are available from the respective projects. Generally, the cooperation of Albanian farmers is not developed as a formal institutionalized agreement between them. The distinguishing feature of the Albanian Farmers' Cooperation is its development as a process that is based on a traditional coexistence in rural communities. Albanian farmers cooperate when they have no other possibility to solve their problems.

To support the farmers cooperation, the Albanian Parliament has adopted the Law No.38/2012 “For agricultural cooperation societies”. Its implementation is accompanied with difficulties because of the lack of the setting-up the institutions and compiling the policies supporting the initiatives for the establishment of farmer`s cooperatives.

NGOs are the most active and committed institutions in tackling the problems of maintaining and sustaining the use of agro-biodiversity. Meanwhile, it should be emphasized that they are also the institutions that face the most difficulties in trying to realize their responsibilities. The lack of a clear strategy and an action plan coordinated with public institutions, such as the Ministry of Agriculture etc., puts these organizations in great difficulty in achieving their statutory objectives. The lack, in public institutions, of a clear vision for the values and needs of such cooperation has often created very difficult situations for these organizations, especially in relation to farmers.

The Albanian Government does not provide for incentives and supportive policies for the organization of farmers in producer associations or breed associations. In particular, the lack of these policies, the lack of programs and projects for the implementation of which public funding sources should be committed, has made implementation of breed programs, programs for *in-situ* conservation and sustainable use of agro biodiversity, very difficult.

1.5. LEGAL FRAMEWORK FOR PROTECTION OF AGROBIODIVERSITY

Article 59 of the “Constitution of the Republic of Albania” states that: *The State shall ensure the protection of the environment and the reasonable utilization of natural resources*. In accordance with this constitutional principle and in order to fulfill obligations deriving from membership and/or ratification of conventions and / or various international agreements for the protection, use and development of biodiversity, Albania developed an intensive legislative process during 1992-2016 periods. The legal acts related to PGR and AnGR conservation and use, approved by the Albanian Assembly during this period, are presented in Annex 4.

The legal acts related to PGR

Since ratification of the “Convention on Biological Diversity” in 1996, Albania has made significant progress regarding biodiversity protection through legislative and institutional framework, as well as by making some concrete steps in this respect.

One of the most important legal acts is Albanian's Biodiversity Law no. 9587, dated 20.7.2006, and amended in 2014, which establishes the bases for the use of genetic resources for different purposes, collection, use of genetic material and samples from *ex-situ* samples and standards for transfer of use.

In the light of the accession process of the Republic of Albania to the EU, and as a candidate country to the EU, Albania has started the transposition process of the EU directives into its national legislation, a process that has been ongoing for nearly one decade. In focus are the establishment of a new legislative and institutional nature protection framework considering C.D. 92/43/EEC on the conservation of natural habitats and of wild flora.

In the framework of Biodiversity conservation, the Nature Protection, in principle, is guaranteed through Law No. 10431, dated 14/06/2011 'On Environmental Protection', in Article 5, which is defined that 'conservation of biological diversity is one of the key environmental elements'. Further to that there are several legal acts guaranteeing the protection of nature in the Republic of Albania such as: Law No. 9587 'On Biodiversity Protection', amended recently by Law No. 68/2014; Law No. 8906/2002, 'On protected areas' amended by Law No. 9868/2008 'On some addendums and changes in the Law No. 8906, date 06.06.2002'.

In order to ensure the implementation of these laws, a number of bylaws have been promulgated to complete the legal basis for specific elements of nature and biodiversity protection, including the listing of protected fauna and flora species published in the Red Book of Albanian Flora and Fauna, the last publication of which was in December 2013.

Since ratification of the "International Treaty on Plant Genetic Resources for Food and Agriculture" in 2010, Albania has made significant progress in field of development their legal framework relevant to protection, conservation and management of plant genetic resources.

In 2011, the FAO supported the creation of a "National Program on Protection and Management of the Genetic Resources", accompanied by an Action Plan and a breakdown of the respective costing. This national program does oblige on the study of the current situation of the genetic fund, and also on future actions to be undertaken on the management of this genetic richness. The program gives details on the duties of each institution and its stakeholders. It is important for the farmers to have species which are autochthonous (*indigenous*) and insure the quality and quantity of food for the population. The protection and sustainable use of the autochthonous germplasm is crucial for sustainable development of agriculture. For this purpose it was necessary to develop the legal base to build the Genetic Bank (1998), and five Agricultural Technology Transfer Centers (2006) that works on the cultivation autochthonous (*indigenous*) species that can be used for the improvement of the species that have to become adapted to the new climate conditions that occur due to climate changes. Some of the gaps on the correct implementation of this program are as a result of insufficient funding, as well as the inter-institutional coordination. For example, the national species collection is managed and protected by different institutions, such as the National Parks by the Ministry of Tourism and Environment, or the Botanic Garden by the University of Tirana, etc.

Agrobiodiversity management in Albania is governed by regulatory frameworks. The main aims of these regulatory frameworks are:

I. Ensuring policy coherence within and across the production sectors towards the conservation and sustainable use of agricultural biodiversity (e.g. using planning at the landscape scale, supporting diversification of small-scale farms, creative appropriate

incentives, etc).

II. Development priorities, institutional settings and other specific socio-economic regional structures.

III. Support the efforts of experts to provide new knowledge to understand how relations between stakeholders within and across production sectors do not preclude the effective and equal integration of agrobiodiversity.

IV. Support the research on environmental policy integration, which can illustrate how these central strategic processes can not only produce isolated ecological targets, but identify ways of applying mechanisms within the other sectors to both fit into existing institutional structures and capacities, and generate ownership in the sectors to be engaged in agrobiodiversity conservation.

V. Support the integration of agrobiodiversity conservation into other processes of production, processing and marketing, as well as those of environment, tourism and fulfilling the food and living needs of families on farms.

VI. Support the prevention of losses and maximize the availability of a wide range of PGRFA for current and future requirements.

The legal acts related to AnGR

Law no. 9426, dated 20.01.2008 'On Livestock Breeding' is one of the most important. In regard to animal genetic resources, the purpose of this law is to ensure the improvement and protection through breeding and conservation programs (*in-situ*, *ex-situ in vivo, ex-situ* cryoconservation) and sustainable use. The Act regulates the following matters:

I. livestock conditions and practices for good breeding, methods and technologies for animal breeding and feeding;

II. criteria for preparation and approval of breed programs;

III. gene funds and native breeds;

IV. professional services in the area of animal breeding;

V. establishment and administration of gene banks;

VI. establishment of breeders' associations;

VII. trade in breed materials.

Article 58 of the 'Livestock Breeding Act', entitled 'Conservation of genetic variability', states that the Republic of Albania holds and provides genetic resources, for a minimal number of animals, doses of semen, eggs and embryos, for specific species, breeds and varieties of farm animals. Funds for conservation and maintenance of genetic recourses are provided by the State Budget and/or private donors, and the modalities and procedures of conservation and maintenance of genetic recourses are defined by the Council of Ministers. This provision prepares the necessary terrain for further developments of all issues related to the conservation of farm animal genetic resources. In particular, it can serve as a legal base for drafting the regulatory framework.

In 'Livestock Breeding Act', issues related to *in-situ* and *ex-situ* conservation of AnGR are treated only in general terms. The Albanian legislation and/or the regulatory framework does not contain any statement regarding the *in-situ, ex-situ in vitro* or *in vivo* conservation as different complementary alternatives for the conservation of local animal breeds at risk of extinction.

The current legislation does deal with subsidies, but their implementation is difficult to be carried

out because of the procedures to be followed. It imposes that the Council of Ministers decide, case by case, on the methodology and procedures used to implement the subsidies. This legislative practice has been followed up to the present day in the case of buffalos and small, native ruminant breeds that are declared as being at risk. The analysis of these decisions shows, that in fact, in both cases, the subsidies are effective instruments, but not enough to solve the problems. For the success of the *in-situ* conservation programs the effective way forward is the combination of an *in-situ* conservation program with the sustainable use of animals that enable the realization of the economic added value. The Albanian legal framework has not yet defined any solution to support such implementation.

The analysis of legislation indicates that the current legislation does not deal with issues that can serve as legal basis for all technical aspects for *in-situ* / *ex-situ* conservation programs. This is because this legislation does not give concrete details on mechanisms and legal instruments that should be used for implementing the conservation programs. Actual legislation does not give, also directions related to the following issues:

I. Which mechanisms, institutions and methodologies should be used to effectively activate public funds for the implementation of *in-situ* and / *or ex-situ* conservation programs for native /autochthonous breeds that are at risk?
II. Which legal instruments can make possible the activation of private funds for implementing AnGR for *in-situ / ex-situ* conservation programs?
III. Which legal mechanisms can make possible the benefit sharing from AnGR conservation programs and sustainable use?

The Albanian National legislation has not fully harmonized the general policies for agriculture and

rural development, intended to establish a long-term vision of the agricultural development and its role in contributing to the national economy, in terms of both a contribution to the gross national product and to employment goals.

The legislative development and implementation need to take into account the strong linkages between technical aspects of Farm Animal Genetic Resources management (e.g. breeding programs and conservation of breeds at risk) and other factors that may influence general implementation of the legislation (e.g. influencing decisions relating to breeding programs or the keeping of traditional breeds).

Notwithstanding that Albania is not part of the EU, its legislation should be developed in accordance with that of EU and international ones. The national legislation on the *in-situ* / *ex-situ* conservation of farm animal genetic resources should take the form of primary legislation, which should contain provisions of a general nature, so to allow the subsequent issuance of related subsidiary legislation. Referring to the economic, political and legal obstacles related to animal genetic resources in Albania, EU legislation and other impacts established as a product of inter-cooperation must be the first key points to help us in improving the legal and practice referring to this issue.

The approximation of the Albanian legislation for farm animal genetic conservation with international and EU legislations requires the treatment of the above-mentioned issues.

1.6. FOREIGN DONOR SUPPORT FOR CURRENT AND PREVIOUS ACTIVITIES RELATED TO AGROBIODIVERSITY

Foreign donors are the main source of financial support for programs and projects for the conservation and sustainable economic use of agrobiodiversity.

The donor financial support is concentrated in different directions and issues. Some of the most important are as follows:

- Support and advise the drafting of national policies, legislation, strategies and programs for the conservation and use of agrobiodiversity.
- Support the development of institutional and infrastructure capacities necessary for the implementation of policies and programs for the conservation and sustainable use of agrobiodiversity.
- Support the formation and capacity development of public and private structures at the local level, necessary for the implementation of regional and local programs and projects for the conservation and use of agrobiodiversity, in general and for mountain regions, in particular.
- Encouraging and supporting NGOs, local government bodies and farmers' communities to develop local programs for sustainable rural development. Support local capacity development, farmers' co-operation and functional co-ordination of work among various groups of stakeholders.
- Support the capacity development for scientific research and for the realization of international cooperation in the field of agrobiodiversity.
- Support education and awareness programs.
- Support the development of regional and cross-border cooperation, for exchange-experiences and the realization of joint projects for research and development, and in particular for the conservation and good administration of trans-boundary genetic diversity.

The financial support is provided through the implementation of joint programs and projects between various donors, the Albanian government, national public institutions, research and development centers, the agricultural university, local government bodies, national and local NGOs, farmers' groups or associations, collectors and processors of agricultural and livestock products, and service providers in rural areas.

The support for the development of institutional capacities and public infrastructure necessary for the administration of agro-biodiversity is generally made by the international organization such as FAO and UNDP. Economic development co-operation agencies such as USAID, GIZ, SIDA, TIKA etc. are also among the important donors.

The donor's program attention is particularly focused on the support of farmers' communities in:

I. remote rural areas, particularly in mountainous regions that lack significant infrastructure and capacity for good administration of agrobiodiversity.
II. regions with a low economic and social level.
III. regions where the migration phenomenon continues to be present, particularly in areas with high rates of young people leaving.

IV. regions where the biological diversity is particularly threatened as a result of hostile behavior, driven by motive for realization of maximum profit.

Below is a summary of some of the projects that have been carried out with foreign donors support.

Regeneration and Safety Duplication of Regionally Prioritized Crop Collections (Regeneration of Grain Legumes Accessions of Albanian Collection). Project Ref. No: GSP09GAT1_1.2_10 GSP09GRD2_1.1_02. 2009-2010, financed by FAO

The main conclusions of the projects were:

- Variation of accessions in working collection of bean crops (especially of the Common bean) in Agriculture Technology Transfer Centre (ATTC) of Lushnja is at a good level and it is useful to be used in genetic improvement programs and/or other programs;
- In total there were 200 regenerated accessions of Common bean, six accession of Chickpea, 11 accessions of Lentil, and 13 accessions of Faba bean;

South eastern European Network on Plant Genetic Resources, 2004-2014. Regional project SEEDNet.The project involves 13 partner institutions from across the Balkans: Albania, Bosnia and Herzegovina (*with two partners from both entities: FBiH and RS*), Montenegro, Croatia, Macedonia, Serbia, Kosovo*, Slovenia. Financed by Swedish International Agency for Cooperation and Development - SIDA. The main objective was to intensify and improve regional cooperation among Balkan countries in terms of conservation and sustainable use of plant genetic resources through a coordinated network of national programs for plant genetic resources.

Collecting the Crop Wild Relatives of the Albania's Umbellifer Crops, 2013. Project LoA Number 13/032: 2013. Financed by ECPGR (The European Cooperative Programme for Plant Genetic Resources). By adopting the program on collecting, mapping, and monitoring of Crop Wild Relatives (CWR), the spectrum of Gene Bank activities has moved to a new level. The objectives achieved as following: a) in total 34 accessions of 13 umbellifer crops were collected; b) the material of Umbellifer CWR from the territory of the Albania is now available for research and breeding, as well as for conservation; c) it was possible to disclose threats to selected wild plants either currently or potentially useful for agriculture; and d) it was possible to start *in-situ* projects for conservation of agrobiodiversity.

Conservation and management of endangered locally adapted crop varieties. Project TCP/ALB/3401, financed by FAO, 2013-2015. This project was focused on the development of local capacities to promote the management of endangered and locally adapted crop varieties in the country and set up a country-base system for monitoring the state of diversity over time.The project targeted economically important varieties of bean, fruit tree (apple, plum and pear) and vegetables (tomato, pepper, onion, and cabbage) as well as some MAPs in five regions of the country.

Baseline study on the status and use of native plant and animal landraces in the CABRA project area (North Albanian Alps). Project no: 2014.2199.9. Financed by GIZ-Albania, August-October 2015.The focus of the project was on the areas of action: (1) Conservation of natural and agricultural biodiversity, and (2) Enhancing rural incomes through sustainable, gender-neutral and equitable use of natural resources. The baseline survey conducted was focused on vegetables, fruits, medicinal and aromatic plants (MAP) and livestock.

Conservation and sustainable use of Agrobiodiversity in the Northern Alps of Albania. Project, Contract No: 83226204: 2016-2017, Financed by GIZ-Albania, (ongoing).This project promotes the conservation and sustainable use of agricultural biodiversity in selected mountain areas in the Northern Alps (accounting for about 8% of country's territory).

Specific objectives: 1) Collect and propagate local varieties and landraces from the project area both *in-situ* (on-farms in the Northern Alps) and *ex-situ* (on site of IPGR ground); 2) Distribute/ disseminate plant material among local farmers in the project area; 3) Training local farmers in breeding and cultivating the local cultivars; 4) Strengthen the capacity of the IPGR for the *in-situ* conservation.

Capacity building to support *in-situ* conservation and use of Animal Genetic Resources. TCP/ALB/3001 (A). Financed by FAO, 2005-2006.

Objectives:

I. Support the development of a National Strategy for *In-situ* conservation of AnGR and a National Action Plan.
II. Build professional and technical capacity amongst key stakeholders to implement a National Strategy and National Action Plan.
III. Establish a National Network to support the implementation of National Action Plan.
IV. Provide recommendations for the design of an appropriate legislative framework to support *in-situ* conservation of AnGR.

Development of a regional network with the function of development sustainable breeding programs for trans-boundary breeds. Financed by the European Regional Focal Point for AnGR, www.rfp-europa.org, 2010-2012.

The objectives were:

I. Identification and evaluation of the current status of AnGR, especially for sheep and cattle breeds.
II. Develop the Common Approach for conservation and sustainable use of local breeds according to the geo-climatic characteristics in the lowland, hilly and mountainous areas in the Balkan region.
III. Exchange ideas regarding the development and implementation a regional cooperation among neighboring countries, in order to identify the economic and cultural values of management and conservation of indigenous breeds at risk of extinction.

Evaluation of the current status of Busha Cattle and develop a regional breeding program for their conservation and sustainable economic use. Financed by European Regional Focal Point for AnGR, www.rfp-europa.org, 2010-2013.

The objectives were:

I. The "white spots" on the map of dissemination of Busha cattle shall be closed
II. Collect data (morphological, production, reproduction traits) for characterization and differentiation the local populations of Busha breed.
III. Identified the farmers, group and/or associations of farmers that can be partners for implementation the conservation program .

IV. Evaluation and dissemination the best practice methods for farming the Busha cattle and marketing their products

V. Development of a cross-border conservation program

Building up the role of National Coordinator of FAnGR for strengthening the Capacity of Balkan's Network for agrobiodiversity of livestock. Financed by European Regional Focal Point for AnGR, www.rfp-europa.org, 2013-2014.

The main objectives were:

I. To support the Balkan countries in their efforts for strengthening the capacity of a Balkan Network.

II. To disseminate good *in-situ* practices based on EU directives and international conventions and develop proposals for concrete action regarding *in-situ* conservation.

III. To develop a 'Common Approach' to the conservation and sustainable use of local breeds according to the geo-climatic characteristics in the lowland, hilly and mountainous areas in the Balkan regions.

IV. To develop regional cooperation among neighboring countries, in order to identify the economic and cultural values of management and conservation of indigenous breeds, at risk of extinction.

Rescue of endangered pig breeds and building up a farmers' network in the Velipoja Nature Reserve, Albania. Financed by GEF/UNDP and SAVE - Foundation project, 2009-2013.

Identification and characterization of small ruminant native breeds in South region of Albania. ALB/SGP/OP4/Y3/CORE/2009/ 10. Financed by GEF/UNDP, 2013-2014.

Current Status of the Brachycerous Cattle Populations in the South Eastern European Countries and Strategies for their Sustainable Conservation. Financed by European Regional Focal Point for AnGR, www.rfp-europa.org, 2011-2013.

BiodivBalkans project "Conservation and valorization of biodiversity for sustainable rural development in the Balkan mountains" Financed by the French Fund for World Environment (FFEM), Government of Albania and CIHEAM/IAM, Mediterranean Agronomic Institute of Montpellier, France, 2014-2015. As part of this project "Hasi goat meat Quality Label" project was implemented by RASP in Albanian mountainous Hasi region.

The objectives were:

I. To establish a Hasi Goat Breed Association, validate a selection scheme and recognize as legitimate by all breeders on the basis of a participatory diagnosis of existing breeding and selection practices and an assessment of the breed performances (milk – meat - breeders); to establish a Herd Book that is in conformity with national standards and requirements.

II. To build label process around the Hasi Goat kid meat through delimitation of the territory, specification of the product (Hasi Goat Kid Meat), selection of the most adapted label and registration of the product as a Geographic Index or Red Label, and establishment of a producer group, dissemination and publicity of the product.

Capacity development initiative on Small Ruminants VC: Dried goat meat. Financed by SARED-RASP. 2016-http://rasp.org.al/ (on-going).

Objectives:

I. To build the capacity of farmers to improve the drying process and food safety for dried meat.
II. Improve processing infrastructure and guarantee the standardization of the product and quality control.
III. Develop a promotional campaign for introducing dried goat meat on to the market

2. GENETIC RESOURCES IN AGRICULTURE

2.1 OVERVIEW OF THE STATUS OF GENETIC RESOURCES IN AGRICULTURE

2.1.1 Plant genetic resources

Cultivation of local populations and landraces

The overall and long term changes in structure and methods in agriculture are the most significant developments affecting the state of genetic diversity in the agricultural sector. The majority of farmers, mainly in the lowland area, which is the main and most intensive area of Albanian agriculture, use modern commercial varieties of agricultural and horticultural crops and base their agriculture on intensified production methods.

About 15 types of crops represent the current diversity within the main agricultural plants of arable crops in Albania. It seems that this diversity level will remain the same in the future also. There is a trend to increase the number of crops of vegetable plants. Thus, for instance, while 30 types of vegetables were cultivated in the lower coastal area in 2005, the current cultivation pattern of vegetable plants comprises 38 types.

There is a trend to increase diversity of modern varieties, especially of vegetable plants. This is due to the introduction of foreign varieties, which compete with their higher productivity, although they are not overly in-demand on the markets due to their unpleasant quality features and taste.

Over the last ten years the ratio between different agricultural crops has changed. For instance, land areas cultivated with cereals have been greatly reduced; only in the last five years, land areas cultivated with wheat have decreased by about 7%. Meanwhile, forage plants are increasing rapidly. During the last ten years land areas cultivated with these plants have increased by 18%. Such change is due to increasing demands for livestock products and fruits and vegetables in local markets. This process is also influenced by economic factors. Cereal production does not provide required revenues and prices of inputs are higher, their yields and selling prices in the market are relatively lower.

In general, crop diversity is clearly expressed among the agricultural areas.

In the lowland and coastal areas farmers mainly use modern commercial varieties of agricultural and horticultural crops, meaning that local varieties and landraces in these areas have been replaced and are actually hard to find in commercial agriculture. In the other two areas (namely the hilly and mountainous ones (in addition to modern commercial varieties, they also use local cultivars of agricultural crops and base their farming on traditional and non-intensified production methods. This means that old varieties, local populations and landraces, have not yet been replaced and consequently can be found in commercial agriculture.

As a result of the distance from the markets and poor road infrastructure, farmers in hilly and mountain areas have been able to preserve the local varieties based on the long tradition of growing specific crops that have a specific taste and resistance to pests and diseases and good

adaptability to specific climatic and soil conditions. But the main difficulty faced in allowing for the continued cultivation of these landraces has been the fact that during the last years the young population of these areas has migrated to urban areas.

In most the cases, in hilly and mountain areas, women are responsible for the gardens, while men are more involved in livestock management, the production of fodder, corn, fruit trees, and grapevines. Men are also helped by women in the processing of the fruit trees and grapevines.

They use traditional knowledge such as crop rotation, manure fertilization, organic mulching, irrigation, etc; manually and using horses and cows. Disease and pest control is carried out without the use of pesticides, applying just local agricultural practices. The crops are mainly used for family consumption, as fresh and as processed products. The excess production is delivered to the local markets and sold, and/or given to relatives.

Many citizens have recently been concerned about the quality of the food, especially vegetables used for fresh consumption that are offered on the market. Consequently, some of them have started to rent plots on the outskirts of cities, in order to establish gardens for the cultivation of vegetables with seed of local varieties for their families.

Seeds of local varieties are produced in family gardens and they are not traded, more frequently they are exchanged among gardeners.

Organized production and distribution of landraces and local varieties would be of great value for the increase of the cultivated areas and their conservation for the future.

In Albania, many traditional cultivars play an important role in agricultural production. The surveys carried out in the regions with a high diversity of local varieties (mainly in hilly and mountain areas), indicates that the area cultivated with local varieties accounts for about 60% of the total crop area of beans, from 25% to 40% of alfalfa, 30% of maize and 50% of the total crop area of vegetables. The data collected indicates that there has been no initiative to support activities related to the assessment of farmers' knowledge, studies on local varieties population structure, on farm breeding or seed multiplication and distribution of local varieties.

A very high diversity occurs among and within traditional cultivars of crops such as:

Vegetables and legumes

From our baseline survey, regarding the crops and landraces which are maintained, results show that almost each family, mainly in villages in the hilly-mountainous regions, maintains and grows at least two to three landraces of vegetable crops. The most popular domestic populations of tomatoes are "Zemër Kau", "Sanjollas", "Serrëke", "Tirana", "Agimi", etc; pepper "Laknasi", "Oblika", "Poçe", "Vethka", "Hundashka", "Gogozhare"; eggplant "Zallherri", "Oblika", etc; onion "Drishti", "Tushemishti", "Dibra", "Mirasi", etc; leeks "Kashari", "Bërdicë", "Belorta", etc; garlic "Korça", Miloti", "Puka", etc; cabbages "Mishja", "Bilishti", "Postriba", "Voskopi", etc, all registered on the National list of varieties as landraces.

Tomatoes "Sanjollas" and "Serrëke"; pepper "Poce", "Vethka", "Hundashka" and "Gogozhare"; onion "Tushemishti", "Dishnica"and "Mirasi"; cabbages "Mishja", "Bilishti", and "Voskopi" are local varieties that are widely cultivated in the Korcha region.

Most spread tomato varieties are red, with a few being pink and yellow in color. "Agimi" and

“Serreke” are used as “industrial” tomato for preparation of traditional products, like sauce and jam. “Zemer kau” and “Sanjollas” are preferred for fresh salads. For some of these landraces, like “Sanjollas” and “Tirana”, there is a specific demand at the markets. The “Sanjollas” type of tomato is grown across the whole country but in a limited number of areas.

Cabbages "Mishja", "Bilishti" and "Voskopi" are produced for fresh consumption, cooking, but also for domestic processing for the preparation of some winter pickles, such as "Pickled"(*Albanian: Turshi*) in the north of the country, a product prepared with cabbage and fermented with salt; and the "Arme" prepared by placing the pieces of cabbage one over the other, throwing in each layer a little salt.

The most well-known is a local landrace of sweet pepper named “Gogozhare”; a unique pepper, present in the villages on the outskirts of Korcha town, with a special taste and a high content of dry matter.

The old gardeners in the hilly and mountain areas still cultivate old landraces of pumpkins and melons. Some pumpkin landraces are used for the preparation of traditional dishes.

In rural areas in the Korcha and Gjirokastra districts, there is cultivated some rare landraces of melon such as “Gorrovec” with aromatic flesh, and “Farashuk” which has seeds firmly clustered in a compact ball.

In addition, there are demands from markets for some plants of spontaneous flora, used as vegetables, such as: *Malva sylvestris L*. (Mëllagë), *Amaranthus retroflexus & albus L.* (Nena), *Urtica dioica L.* (Hithra), *Atriplex hortensis L.* (Laboti), *Cichorium intybus L.* (Radhiqe), *Portulaca oleracea L.* (Bordullak), *Papaver rhoeas L.* (Lulekuqe), *Sonchus oleraceus L.* (Rrëshyell), *Rumex patentia L.* (Lëpjetë), *Mentha suaveolens Ehrh.* (Mendra erë mirë), *Mentha x pipertita L.* (Nenexhik, Mendra), etc., which are cultivated in small plots by farmers of rural areas.

The bean is the crop that has always been present in the farms, because it is widely used for consumption in the rural areas, especially in the hilly and mountain areas. In the country it is well known which landraces and local varieties have the highest diversity, concerning the plant and seed characteristics. Each farmer cultivates at least two types of dry beans, runner, and bush types. Some farmers in hilly and mountainous areas of Skrapari and Përmeti district, in the south of Albania, but also many others in the northern area of the country have preserved old landraces and the traditional practices for the cultivation of mixed cropping (corn + bean + pumpkin).

In the large diversity of beans, the favorite ones are: “Shijaku”, "Kallmet", "Shalë", "Luzni", "Eçmenike"and “Trenare” beans characterized by kidney- shaped seeds.

Cereals

The majority of wheat production in Albania relies on commercial varieties, where 80% of the national seed request is covered by imported ones. The rest of the needs are met by farmers themselves and some breeding activities.

In the remote and mountainous villages of the Korcha region, up until the early 1970’s, several old wheat landraces were grown, such as "Grurë kuqi", "Zhulica e bardhë", "Zhulica e kuqe", "Rapsalli i bardhë" dhe "Rapsalli i kuq". The Zhulicas were old landraces and differed from each other by the color of the grains. They were late harvesting, long stems, cobbled with needles, suitable for cultivation in harsh climate mountain areas. Commonly they affected by stem rust

(*Puccinia graminis*) and damaged by the warm winds coming from the south. They were observed for the last time in 1974, cultivated in the highlands of Korcha, in the villages of Panariti. “Rapsall” wheat of species (*Triticum turgidum*), were grown in the southeastern part of Albania, mainly in the Korcha region, called "qiqirec" or "qipirec". They were of two forms: "Rapsalli bardhë" and "Rapsalli kuq".

The local varieties of wheat are now completely lost, although they were preferred for production by farmers in the past.)

In some villages of the Kukes region, and less so in the Korcha region (Moker, Voskpoje, Vithkuq, Kolonja), two old landraces of ray such as “Shishtaveci” and “Voskopoja” are still present, due to the lack of commercial seed in these areas. The grain of rye is used for the bread production, while the straw for covering the livestock stands.

A high diversity occurs among cereal crops, especially for maize, cultivated in the country. Good examples are the widespread landraces of maize “Reçi”, “Sulova”, “Çelike”, “Morave”, “Gushtak”, etc.).

For market sale and fodder, farmers produce corn with commercial hybrids, while for family consumption they maintain and use local landraces, which are the favorite ones because of their specific taste. They have been used for many generations for the preparation of traditional dishes, mainly in celebration of traditional holidays.

In the central part of Albania "Summer Day" (14th March), of ancient origin, is celebrated each year. The celebration is performed in honor of the nature and vegetation that takes place on this date. The distinctive sign of this celebration is cooking *ballakumes*, a very special dessert prepared with corn flour, which, for more than three centuries, it has been considered as a local corn landrace "Sulova". This landrace in the villages of Sulovo is sown in more than 300 hectares. In the northern part of the country, the flour of corn “Reçi" is used for the preparation of a special bake which is served on the table treated with fermented milk. This corn in the villages of this area is sown in more than 200 ha. The corn landraces mature early.

Fodder crops

Fodder production, excluding maize based on modern varieties, is based on local cultivar and traditional methods. The diversity of fodder crops is represented by some cultivated grass and leguminous species, such as local alfalfa “Tomin”, but there is a much higher number of plant species that make up the annual and perennial meadow flora.

In Albania over the last decade, many commercial imported alfalfa varieties have been introduced. However the farmers’ interest for the alfalfa landrace “Tomin” is high, but the production and distribution of the seed should be organized in order to avoid its extinction.

Loss and degradation of natural meadows are a threat to genotypes of plants, which are dependent on such habitats. Loss of diversity and genetic resources in such habitats is considered to be significant and also increasing. Domestic breeding of fodder crops, which utilizes germplasm from indigenous sources, is to some extent compensating for the loss of such semi-natural habitats.

Industrial crops

Over the last three decades, the greatest loss of diversity, both at the level of crops and landraces

and local varieties, has occurred in industrial crops. Several decades earlier the most widespread industrial crops were cotton, tobacco, sunflower, and sugar beet, and there were several industrial factories in Albania for the processing of these products. After the political changes of the 90's, these factories closed and the production of industrial crops declined sharply or halted. Almost all the landraces of these crops, in addition to tobacco, have been lost. Some tobacco landraces, such as "Sheldi", "Shirgjani", "Rroskoveci", etc., are still maintained and cultivated, but mainly for consumption by farmers themselves.

Fruit crops

Fruit trees can be found in each region of Albania due to the great diversity of crops and cultivars of fruit trees complying with higher variation of climate and soil conditions that characterize the country, which has allowed, through centuries, the cultivation of a large number of fruit tree species, typical of the Mediterranean region.

Commercial orchards were planted by agricultural cooperatives and communist enterprises before the '90's, but also the orchards of today's farms destined for the market, mainly consist of registered varieties. Moreover, recent decades have a tendency, which happens to be spreading rapidly in the low and coastal area, where farmers are replacing old varieties in gardens with new ones. However, old varieties of fruit trees are still present in many villages in hill / mountainous regions, mainly as trees with historical (or memory), cultural and food value, but also as 'forgotten trees' in the villages with population migration. Most often they are situated along roads, side plots, at the border of farmers' properties (as markers), on the meadows or within abandoned areas. Currently, there are many species and varieties of fruit trees, olives, and grapes that have a high level of adaptability to particular agro-ecosystems, with high nutritious and taste values, suitable for competitive markets, particularly for organic and typical products. The rich diversity in the field of arboriculture and the ancientness of their cultivation is clearly expressed by the fact that many cultivars are named according to their place of cultivation, like "Molla e Hoçishtit", "Molla Gjeçe", "Molla e Zheit", etc; "Dardha e Karkanjozit", "Dardha e Pinarit", "Dardha e vakufit", "Kumbulla Tropojane", "Kumbulla çifte e Elbasanit", "Fiku Roshnik", "Fiku Cingell", "Fiku Patëllxhan", etc., while the most popular autochthon olive varieties include "Kaninjoti", "Kokërrmadh i Beratit", "Kokërrmadh i Elbasanit", "Krypsi i Krujës", "Ulliri i Bardhë i Tiranës", etc. Autochthonous olive cultivars occupy more than 85% of the area of Albanian olives.

Grapevine

Wine and raki (a traditional alcoholic beverage) are traditional produce in Albania, based on cultivation of many different grapevine varieties. In viticulture (grapevine), the most popular autochthonous varieties, which are widespread in the country, include "Sheshi i Zi", "Sheshi i Bardhë", "Kallmet", "Vloshi", "Serina", "Debina", "Tajgat", "Pulez", etc.

The most recognized autochthonous variety for red wine production so far is "Vloshi", which has been grown in the Narta (Vlora region) for centuries.

The oldest autochthonous varieties of raki and wine are "Sheshi i Zi", "Sheshi Bardhë", grown in middle Albania. They are considered to be the most important grape varieties and represent almost 50% of all grapevine varieties that are grown in the country.

Despite the fact that the plant genetic resources have an essential role in the agriculture and food security of the country, the level of attention given to their collection, conservation and sustainable use is still insufficient.

Medicinal and aromatic plant

Medicinal and aromatic plants (MAPs), which widely occur in the country, comprise an important natural economic resource, not totally and sustainably exploited yet. Among the species that are planted on large surfaces are Savory (*Satureja montana*), Oregano (*Origanum vulgare*), Sage (*Salvia officinalis*), Mint (*Mentha piperita*), Rosemary (*Rosmarinus officinalis*), Lavender (*Lavandula officinalis*), White mustard (*Sinapus alba*), etc. These species are planted, but may be found in a natural state throughout Albania.

In addition to these above-mentioned agricultural species, more than 300 species of medicinal and aromatic plants (MAPs) belong to the Albanian flora that occurs in the wild state. Among them, 30 are endemic species, which means they are grown only in Albania. The MAPs are important natural and economic resources of the country. About 182 of these species are rather widespread and many of them are harvested and exported. Over-harvesting, improper management, together with habitat changes across most parts of Albania in the last two decades are threatening the genetic diversity of several MAP species. Sixty-eight medicinal species are considered endangered and 40 MAPs are included in the National Red Data Book.

Through direct field observations, during the implementation of the program for assessing the situation, a large genetic erosion of aromatic and / or medicinal plant populations was detected and identified, through the support of the FAO project TCP / ALB / 3401, due to their collection without criteria, rooting them up, and thereby destroying their ability to naturally regenerate.

In Albania, erosion of plant genetic resources has occurred in the past and is still occurring today. The main evidence of this phenomenon is the continued loss of local varieties from farmers' fields. Even though a systematic assessment of the occurrence of genetic erosion in PGRFA in the country has not been carried out, experts affirm that based on observations, as well as time comparisons, genetic erosion has already affected almost all plant groups.

Based on observations carried out by agricultural research institutes, and according to the data taken during some collection missions carried out during 1941 and after 1990, its results show that during the last fifty years, the genetic erosion of some species was estimated to be about 94% for *Triticum aestivum*; 100% for *Triticum durum*; 100% for *Triticum turgidum*; 83% for *Triticum monococcum*; 76% for *Avena spp*.; 59% for *Hordeum vulgare*; 78% for *Vicia ervila*, and 42% for *Vicia sativa*.

The main driving factors of genetic erosion included:

The replacement of local varieties by modern varieties (imported varieties and hybrids).

With wild flora, mainly for medicinal and aromatic (MAPs), one of the main causes of erosion is over harvesting, particularly when harvesting occurs without respecting the plants biological criteria for natural regeneration. Fires also may cause irreparable damages, if such fires occur during certain phenological stages.

The social - economic changes and demographic migration, abandonment of rural areas, mainly in hilly and mountain areas, which are richer in plant genetic resources, have been factors that have increased genetic erosion.

During recent times, the constant abandonment of rural farming in Albania, combined with the progressive introduction from abroad of commercial varieties and the expansion of land use for social developments represent unprecedented threats to the local crop diversity of traditional

farming systems and are major causes of genetic erosion.

Furthermore, changing of climatic conditions, including heat stress intensification and changed rainfall patterns have added increased pressure over natural habitats with negative consequences on the occurrence and distribution of wild crop relatives in the country. This phenomenon is particularly alarming as these species represent an important reservoir of diversity for crop improvement and adaption to changing environmental conditions.

Results of a baseline study on the status and use of native plant and animal landraces in the CABRA project area (North Albanian Alps), carried out during the second half of 2015 and financed by GIZ-Albania, should be considered with great care and should be considered. The main driving factors of genetic erosion in this area are social-economic changes and demographic migration, abandonment of rural areas, lack of niche market, etc.

For the same reasons mentioned above, a large number of traditional cultivars have been lost. For instance, actually there are no longer any wheat primitive cultivars. Also, many open pollinated varieties of maize have been lost, etc. To some extent, vegetable crops are an exception in this respect, as many farmers successfully use local varieties and landraces and the market demand for their products is increasing.

Wider expansion of local populations or landraces requires legal support. They are accepted by consumers who are increasingly demanding them in markets for their special quality standards, especially their taste, as compared to foreign cultivars.

It is also of special interest to use the landraces and local cultivars directly in production, just as authentic cultivars. Through such a way a number of cultivars have been re-introduced to production; however, more interesting is the reactivation of landraces. This is more noticeable for vegetables (tomato, pepper, pumpkin, onion, leek, lettuce, okra, cabbages, broad bean, etc.). Many traditional cultivars of local beans play an important role in agricultural production, such as local bean cultivars: Shijaku, Kallmeti, Shalës, Luznis, Eçmenike, etc., fruit trees (apple, pear, fig, plums, pomegranate, quince, etc), for some fodders, common bean, maize, grapevines, olives, and some special peppers.

Some of the local varieties mentioned in this chapter are registered on the National List of Varieties. But the present list needs urgent revision, followed by the registration of all autochthonous varieties.

In the present and actual state of plant genetic resources in Albania, it would be necessary to undertake some activities for holding back the factors that cause genetic erosion.

2.1.2. Animal genetic resources

In the Republic of Albania native and autochthonous animal breeds make up an important part of the farm animal population. According to the Country Report that was prepared in frame of The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture (2013), there exists in Albania 39 native breeds, autochthonous and local adapted breeds, and 13 exotic breeds. A very big part of the animal farm population in Albania consists of crosses of the native with exotic breeds.

Cattle

Referring to the milk and meat production, bovine is the main species of farm animal populations in Albania. Cattle produce about 80% of the country's milk, and around 45% of its meat. In the breed structure of this species about 95.3% are cattle of exotic breeds, such as Holstein, Jersey, Simental, Taranteze and their advanced crosses with the Albanian native cattle breeds. Crossing of native cattle breeds in Albania with other breeds, in order to improve milk production began in around the 1930's. It has subsequently been very intensive during the second half of last century.

Table No.1 Number of native/local and exotic breeds

Species	Native/ locally adapted breeds	Exotic breeds
Cattle (specialized dairy)	5	3
Cattle (multipurpose)		1
Sheep	6	3
Goats	10	2
Pigs	3	1
Poultry	5	3
Horse	3	
Asses	2	
Buffaloes	1	
Rabbits	1	
Turkeys	2	
Bee	1	

Cattle population in 2015 was 504,200 heads, out of which 357,100 were pregnant heifers and milking cows. About 70-75% of this population breeds in small farms, with between one to four cows. The milk production is for family consumption and part of this is marketed. In these small scale farms there are cows of exotic breeds and/or their crosses with native cattle breeds.

In the coastal plain area the Holstein are kept, and crossings with this breed. In the hilly area, there are advanced cross-breeds with the Jersey and Simental breeds. In commercial farms with an average of 10 to 50 cows, which account for about 20% of farms which make and in large commercial farms with >50 heads, up about 5%, there are mainly exotic cattle breeding, Holstein, Simental, etc.The native cattle breeds are farmed mainly in mountain areas.

Currently, four populations are identified, which, based on estimates of phenotypic and morphometric traits and molecular characterization are classified as native cattle breeds (Table no.2)

Table no. 2 Population size of Albanian native cattle breeds

Native cattle breeds	Population size			Actual Trend
	Total	Bull	Cows	
Illyrian Draft cattle named"Albanian Prespa Cattle"	750-800	18	500-550	↗
"Busha" cattle	600-650	14	400-450	stable
Busha strain "Lekbibaj cow"	650-700	20	500- 550	↗
Busha strain "Gurgucka"	250-300	8	150-180	↗
Illyric cattle "Red of Scutary"	45-50	4	25-30	↗

The native cattle breeds occur in small family farms in hilly and mountainous regions of the country, especially in isolated areas, under the conditions of the traditional production system. Animals are kept on the pasture during the day. At night, they are housed in a simple stable. Cows stay in stables only on very cold days of winter. Selected bulls are used for natural matching, avoiding close inbreeding. The cooperation between small-scale family farms consists of exchange of bulls for natural matching only. Regardless of the size of the farm, the identification of animal (ear tags) was established but not used for breeding programs aims. The breeding programs in cattle population are not implemented. Breed associations are not effective and performance control has not been established, nor the progeny test and have not the Bull Semen Production Centre.

For reproduction purposes and genetic improvement of exotic breeds and their advanced crosses with Albania native breeds, farmers use imported biologic materials. About 65% of the cattle population is under artificial insemination. The selection of foreign bulls is made by the operators that import the semen, whilst the insemination is carried out by the artificial insemination private operators, with the agreement of the farmers.

As for the rest of the cattle population natural mating with unprompted bulls is the norm.

With financial and technical support of different donors and international agencies and NGO-s *in-situ* conservation programs were implemented for all native cattle breeds at risk of extinction. For conservation purposes and sustainable use, the farmers that breed Illyrian draft cattle "Albanian Prespa cattle" and "Busha" cattle were supported for capacity building necessary for the implementation of the conservation programs, programs for management and sustainable use of their animals and, to enhance the capacities for the development of the traditional system of production and/or traditional processing methods.

Buffalo

In 1938, the total buffalo population was about 25,000 heads. The majority of buffalos were situated in the coastal lowland area of Albania. Between 1950 and 1990, the buffalo population was considerably reduced as a result of draining swamps, the mechanization of the agriculture, development of transport in agriculture and the high-intensity increase of the dairy cattle population. Recently, as a consequence of the political, social and economic transformations that brought about the disintegration of state farms and agricultural cooperatives, the buffalo population was catastrophically reduced. The population size currently stands at 350 animals, 38 bulls, and 210 cows (MoAF, 2013).

In Albania, buffalos are in general used as draught power. Slaughtering young male buffalos chiefly provides the meat. Milk is freshly consumed and there is no tradition of cheese production. The management system of buffalos is actually extensive. The main feeding sources of buffalos are grazing, the cultivated forages, alfalfa, and hay. A small intake of concentrated feed like maize or bran is used during the wintertime. Milk yield is low, about 380-480 kg. Albanian buffalo are classified into the group of Mediterranean buffalos.

Sheep

Sheep breeding has a long tradition in Albania. According to the population size and their trend (Table no. 3), the current status of four main important native sheep breeds “Rrecka”, “Ruda”, “Bardhoka” and “Lara of Mati” are not endangered breeds. The size of the “Rrecka” common breed population is decreasing rapidly. The farmers use these native breeds for commercial production. These four sheep breeds together produce about 45% of the total sheep milk and about the 35% of the total small ruminant meat. The low input production system is predominant. No genetic improvement program is being implemented and the selection of reproducers is made by the farmers themselves, empirically.

To increase milk and meat production, over the last twenty years the interest of the farmers has moved towards the crosses of their native sheep breeds with more exotic breeds. The Small Ruminant Station (Public institution) has the responsibility to organize and implement the programs for the implementation of crosses schemes, as well as providing advice for farmers.

*Table no. 3 The population of native sheep breeds**

Breed	Number			Actual Trend
Native breeds				
	Total	Rams	Ewes	
Rrecka	675,000	15,100	414,000	↘
Ruda	87,500	3,050	71,000	↗
Bardhoka	45,600	1,350	39,500	↗
Shkodrane	450	18	350	↘
Lara of Mati	11,200	750	9,400	↗
Lara of Polisi	720	31	560	↗

The sheep population of cross-breeds is a large part of the total Albanian sheep population. This is widespread in almost all of the country's territory. The animals breed on farms from 20 - 50 heads up to 250 - 300 heads. For this population, used for commercial purposes, it is important to have the performance control in breeding nucleus herds, the establishment of the herd book and support of farmers for implementing the breeding programs and for increasing the economic value through processing and marketing of the products. Without a breeding program it is difficult to evaluate the development of genetic capacities and dynamic of production traits of the breeds, it is not possible to assess the trend and effects of improvement genetic programs or crossbreeding programs. In these conditions it is difficult to monitor the inbreeding coefficient. An effective management of the breeds it is not possible; nonetheless, currently there are no policies and the national action plan is not yet compiled.

The organization of farmers in breed associations and their support to develop capacity for processing and marketing of the products are one of the important current needs. Renewing the tradition and craft of wool processing is required.

Goat

Native goat breeds account for about 97% of the total goat population. The main part of produce of farms breeding the ecotype "Velipoja", "Caporre of Dragobi", "Caporre of Mokrra", "Black of Liqenasi" and "Dukati" is for the local market. Tourism is a factor that affects positively the increase in populations of these native ecotypes or breeds.

Table no. 4 Population of native goat ecotypes/breeds

Ecotype/ Breed	Number	Actual Trend
Native ecotypes or breeds		
Caporre of Dragobi	10,200	▼Decreasing
Hasi	43,500	— Stable
Velipoja	2,200	▲Increasing
Red of Mati	47,800	— Stable
Lara of Kallmeti	900	▲Increasing
Capore of Mokrra	5,200	▼Decreasing
Black of Liqenasi	3,150	▲Increasing
Dukati	6,500	▲Increasing
Muzhake	54,600	— Stable
Native unclassified	664,140	▼Decreasing

The populations of "Hasi", "Red of Mati" and "Muzhake" ecotypes are commercial populations. The average size of farms breeding these ecotypes is between 150-300 heads.

The management of the genetic funds of native / local sheep breeds is conducted by the farmers themselves. The farmers select the bucks, using empiric information. The selected bucks are used in a turnover scheme in village farms only. Farmers' poor knowledge regarding breeding programs, the lack of information available, and poor cooperation among them in exchanging bucks etc., produces a high percentage of inbreeding. Consequently the level of genetic erosion increases and the urgent need for the implementation of the *in-situ* conservation program is evident.

The import of exotic breeds is developing fast. The management of their genetic fund and improvement is done only through imported reproducers and their breeding takes place on large commercial farms. At the same time, it is important to note that the number of farmers interested in crossing the native goat breeds with exotic breeds is increasing. To reduce the effect of the genetic erosion, which is caused by this uncontrolled process, it is necessary to develop and implement specific policies and have in place the appropriate institutions, which should monitor it.

Pig

The pig population in 2015 was evaluated to stand at around 171,400 head of pigs, out of which 11,400 are sows and first farrow sows (Statistical yearbook, 2011-2015, INSTAT). The greater part of this population breed is under low input system of production, on small-scale family farms. It is usual that on family farms one to two sows are bred that are the crosses from different exotic breeds.

The commercial farms rear the pigs for fattening with the animals being imported from neighboring countries, mainly Greece and Bulgaria. The breeding program implemented into the commercial pig farms and in industrial complex farming for fattening pigs is based on imported breeds. Only one commercial company produces the sows and boars for the needs of farms producing pork meat.

During last ten years three native pig breeds have been identified. These breeds are farmed in an isolated areas, such as Back Rrjoll village, near the tourist area of Velipoja. Referring to their size population (Kume, K. 2014) all three native pig breeds are at critical risk of extinction (Table no. 5).

Table no. 5. Native pig breeds-The size population and trend

Breed	Number			Actual Trend
	Total	Boars	Sows	
Siska white of Scutary	225-250	6-8	31	↗
Spotted of Scutary	350-40	18-20	42	↗
Pig with wattle	200-250	10-12	24	↗

Being close to the tourist area of Velipoja, the produce is mainly used for tourists. The Back Rrjoll village where these populations are farmed has been announced as a rescue station. *In-situ* conservation program that was implemented until now is a success story.

Poultry

Poultry breed in two types of farm only: Family farms for self-consumption and medium-sized commercial farms and industrial complexes that produce eggs, broilers or poultry meat. The breed of poultry growing on family farms is undetermined. Commercial farms and industrial complexes use only the imported genetic material. The breeding programs are not implemented in either the family farms or in commercial poultry farms.

The general information about the status of all Albanian farm animal native/ autochthonous breeds are shown in Table no. 6. According to this data, out of 31 native/ autochthonous breeds 12 of them are at critical risk and two at the risk of.

Table no. 6 Current status of Farm animal genetic resource – Native/ autochthonous breeds

Species	Most Common Name (Native/local Breeds)	Current Status	Reasons for Current Status
Pig	Native pig "Pig with wattle"	Critical	Replacement by imported breeds and crossbreed with them. Low production and low income for family farms.
	Native pig "Spotted of Scutari"	Critical	
	Native pig "SiskaWhite of Scutari"	Critical	
Buffalo	Buffaloes	Critical	Low economic interest of farmers.
Cattle	Ilyric Dwarf cattle "Albanian Prespa cattle"	Endangered	Replacement by imported breeds and intensive crossbreed with them. Low production and low income for family farms.
	Ilyric Dwarf cattle "Gurgucka cattle"	Critical	Low production and low income for family farms.
	Busha type "Lekbibaj Cattle"	Critical	Crossbreed with Jersey and Simental cattle breed. Low production and low income for family farms.
	“Busha” cattle	Critical	Crossbreed with Jersey and Simental cattle breed. Low production and low income for family farms.
	Illyric cattle “Red of Scutary”	Critical	Crossbreed with Jersey. Low production and low income for family farms.
Goat	Ecotype "Goat of Velipoja"	Vulnerable	Low production and low income for family farms.
	Ecotype "Capore of Dragobia"	Not endangered	Interest of farmers to produce the meat and milk for family consumption and difficulties to farming the cattle and sheep in the harsh conditions of the mountainous areas.
	Ecotype "Goat of Hasi"	Not endangered	Interest of farmers to produce the meat and milk for family consumption and difficulties to farming the cattle and sheep in the harsh conditions of the mountainous areas.
	Ecotype Goat "Red of Mati"	Not endangered	Interest of farmers to produce the meat and milk for family consumption and difficulties to farming the cattle and sheep in the harsh conditions of the mountainous areas.
	Ecotype "Red of Krraba"	At risk of extinction	Increasing interest of farmers to farming one or two cows in their family farm.
	Ecotype "Capore of Mokrra"	Critical	Lack of infrastructure for processing and marketing of milk.
	Ecotype " Black of Liqenasi"	At risk of extinction	Low production and increasing the interest of farmers for farming the cows in their family farm. Lack of human resources, immigration of young people and absence of shepherds.
	Ecotype "Black of Dukati"	At risk of extinction	Immigration of population to urban areas.
	Ecotype "Spotted of Kallmeti"	Vulnerable	Interest of farmers to produce the local milk and meat productions for local market and tourists
	Ecotype "Muzhake"	Not endangered	Good alternative for produce the milk and meat in harsh conditions of hill and mountain areas

Sheep	Native breed "Shkodrane"	Critical	Decreasing the interest of farmers for wool. Small animal with low milk and meat production.
	Native breed "Bardhoka"	Not endangered	Interest of farmers to produce the milk and meat. Animal with good production performances.
	Native breed "Ruda"	Not endangered	Increasing the interest of farmers to produce meat. Animal with good production performances.
	Local sheep Native Mati"	Not endangered	Increasing the interest of farmers to produce meat. Animal with good production performances.
	Native breed "Spotted of Polisi"	Critical	Migration of population to urban areas. Lack of infrastructure for marketing the produce.
	Common breed 'Rrecka"	Not endangered	Alternative for milk and meat production in most of the rural areas in conditions of extensive traditional low inputs production system
Poultry	Local "Tirana chicken"	Critical	Crossbreed with imported breeds.
	Local Black Tropoja Lekbibaj	Not endangered	Increasing the interest of farmers to produce the eggs and meat for family consumption.
	Local Black Devolli	Not endangered	
	Albanian Patridge color chicken	Not endangered	
	Speckled Albanian chicken	Not endangered	
	Bronze and Copper Turkey - Zadrima	Not endangered	Increasing the interest of farmers to farm turkeys for local market - Albanian tradition for of eating turkey meat at New Year.

Genetic improvement programs - Obstacles

Despite the fact that according to the Albanian legislation all the farm animal population should be under genetic improvement programs, in reality this legal condition is not yet implemented. After analyzing this situation, in the Albanian Country Report 2013, the FAO noted that the main constraints to the implementation of breeding programs consist of insufficient capacities of public and other institutions, like research centers, public extension service, NGO's etc. to compile the realistic breeding policies and programs, together with a lack of financial support, a poor level of knowledge and awareness in farmers community, and also problems referring to the collaboration between the farmers.

Genetic improvement programs - Needs

The implementation of breeding programs requires intervention in order to elaborate the policies to support them, establish and update the "Inventory book" and "Book of bred" in every farm marketing their products. Support for the farmers is required to implement the performance control and recording system in farms under intensive and semi-intensive production systems, and it is important to establish a breeders' associations. It is also important to strengthen the capacities to support monitoring of the natural mating and to implement an effective financial institution in rural areas (Albanian Country Report The second report on the state of the world's animal genetic resources for food and agriculture, FAO, 2013).

2.2. CONSERVATION EFFORTS OF GENETIC RESOURCES

2.2.1 Plant genetic resources

The first collecting expedition in Albanian territory was organized in 1941, led by the German scientist Hans Stubbe, mainly to study cereals and legumes. The seed samples collected (355 accessions) were sent for conservation at the Institute of Plant Genetics and Crop Plant Research (IPK) in Germany. The information about these accessions is available from the IPK database.

The first organized and government-supported activities related to the conservation and use of PGR in Albania were undertaken during the period 1950-60 by the Agricultural Research Institute of Lushnja. Many local varieties of wheat, barley, oats, maize, legumes, etc, were collected, with which the first collections of agricultural crops were created. Only for wheat, the 1956 mission collected 13 local varieties of *Triticum turgidum* and 11 local varieties of Triticum aestivum. They served to start the breeding of agricultural crops. From the collected material some were selected, which for several years were the basis of agricultural production.

In the early 1970's, the Agricultural University of Tirana (AUT), under the leadership of Professor Përmeti, organized several research and collection missions of autochthonous varieties. About 220 accessions (acc) of maize, two acc of alfalfa, 79 acc of beans, etc. were collected. In conjunction with this, in the period 1970 - 1980 several collection missions were carried out by the Maize and Rice Institute (MRI) of Shkodra, Agricultural Research Institute (ARI) of Lushnja, the Vegetables and Potato Research Institute (VPRI) of Tirana, the Institute of Tobacco - Cerrik (ITC), the Fruit Tree Research Institute (FTRI) of Vlora, etc., as partners of a large project of the Agriculture Ministry for the identification and collection of local varieties and landraces in the country. During these missions more than 2,000 accessions were collected.

During 1993-96, IBPGR (today-IPGRI) supported a project "Initial activities for conservation of PGR in the Republic of Albania", which was implemented by IPK Gatersleben (Germany), the Institute of Plant Germplasm of Bari (Italy), and the Agricultural University of Tirana (AUT). During this period, 6 collecting missions were organized. Fourteen scientists (German, Italian, American, Polish and Albanian) were actively involved and collected 1,136 accessesions from 210 sites in Albania.

During last decade, several baseline survey and collecting missions have been carried out with support from SIDA (SEEDNet project, 2005-2011, were collected 630 accessions of 27 genera and 36 species, in 10 districts of Albania) and FAO (TPC/AL/3401, 2013-2015), were collected 551 accessions of vegetables, fruit trees and MAPs).

These missions have significantly contributed to increase the diversity of the germplasm stored and conserved in the National Gene bank, in particular local crop varieties and their wild relatives, as well as medicinal and aromatic plant species.

Overall, *ex-situ* conservation of PGRFA in Albania has shown considerable progress over the past years as it has benefitted from institutional support and arrangements between the Agricultural University of Tirana and the Ministry of Agriculture.

The Albanian National Inventory of base collections includes in total 4,105 accessions. Out of these, 3,219 accessions are maintained as seeds under long-term conservation at the National Genebank and the remaining 886 accessions of fruit trees are conserved in the field collection (614 accessions by the National Genebank and 272 accessions by ATTC Vlora). These accessions of the national inventory represent about 147 different plant species. Working collections of about

8,000 seed accessions of mainly wheat, beans and vegetables, are maintained at ATTC Lushnja.

Overall, the characterization and evaluation of genetic material in storage is at a low level. With regard to *ex-situ* collections, out of 605 accessions characterized during the last five years, about 188 accessions belong to bread wheat, 50 accessions of durum wheat, 104 accessions of maize, 117 accessions of beans, and 146 accessions of vegetables. Generally, agricultural research experts have characterized and evaluated plant genetic resources based on the descriptors of IPGRI, UPOV. These activities have been conducted and are also continuing with wheat, maize, common bean, vegetables, fruit trees, etc. However, there is still much work to be done in this direction because characterization and evaluation have not been completed for the entire range of plant genetic resources already in possession. Thus, for instance, these scientific procedures with vegetables have been completed for 46 accessions of tomatoes, 32 accessions of pepper, 24 accessions of cucumber, 19 accessions of melon, 12 accessions of cabbage, 10 accessions of lettuce, etc. In order to reduce the risk of introducing duplicate accessions, a molecular characterization of seeds stored as well as newly collected accessions may be conducted in particular for the fruit tree germplasm whose cloned materials tends to show different phenotypic characteristics in different environments.

Regeneration is an essential operation of the National Genebank which maintains the Albanian base collections of orthodox seeds. Actually out of the 3,219 seed accessions conserved under long-term storage conditions, about 10% have been regenerated and about 50% of the remaining accessions need to be regenerated. No financial provisions are currently available to satisfy this urgent need.

Also limited is the amount of genetic material distributed by the Gene bank in the last four years (only 466 accessions): 20 accessions have been given to the Faculty of Natural Science, 88 accessions to the Agriculture University of Tirana (Dept of crop production), 19 accessions to the Novi Sad University of Serbia, 19 accessions to the National Gene Bank of Ukraine, and 320 accessions to farmers or private companies.

The on-farm conservation and management of plant genetic resources in Albania is focused only on some farms intending to test varieties for their production capacities and improved cropping techniques. The reported data indicates that on-farm management activities have been mainly carried out for local vegetables cultivated mainly for family consumption and market sale, in the communities of the Korcha region and the Albanian Alps area (ten vegetable crops: onion, cabbage, melon, pepper, tomato, pumpkin, lettuce, leek, garlic, and pod beans), leguminous crops (two local bean varieties) and local forage varieties (two local varieties of alfalfa, two local varieties of oat). About 170 farmers were reportedly engaged in these activities during the last few years.

After analyzing the findings of our study (2011-2014), in the Korcha region, for on-farm conservation and sustainable use of traditional cultivars (landraces), five ways are suggested: a) promote the added value of products; b) consolidation of specialized markets that efficiently utilize their organo-leptic qualities; c) creation of awareness at different levels; d) restoration and reintroduction of traditional cultivars through crop improvement processes; e) subsidize on-farm conservation and management of vegetable landraces, because their conservation and management can be considered as a service that should be rewarded by society.

On the other hand, institutional support to *in-situ* conservation (including on-farm conservation) has been, over the years, discontinuous as past efforts, such as the establishment of a *National Network for on Farm Conservation*, failed to set up sustainable institutional arrangements. As a result, on-farm conservation is actually organized on a voluntary basis by farmers only.

Although farmers in many areas of the country (especially in remote areas) cultivate their local crop varieties, they know little in regard to the germplasm stored *ex-situ* and its value, which therefore becomes, in practice, not accessible. Furthermore, as mentioned above, initiatives and public funds for *in-situ* and on-farm conservation are, on the whole, absent.

Also, the surveys show that there are no activities related to local varieties assessment for utilization and management, or activities for socio-economic assessment of PGRFA on farm management and improvement.

In general, the cultivation and multiplication of local crop varieties is part of a tradition preserved in some remote mountainous areas which are characterized by an extensive agricultural system with low mechanization levels and low inputs. The conservation and multiplication of these local crops is carried out spontaneously by farmers, in general without any support by institutions or specific projects, excluding corn, beans and vegetable crops, for which farmers are supported with technical assistance by regional specialists (in the Korça) and the CABRA project (in the Albanian Alps).

The Albanian government is promoting organic farming and the surface of this field has increased over the last ten years. This is to some extent broadening the diversity of local varieties and traits used in agriculture.

Given this unfavorable situation with lost or endangered crops/landraces, CABRA and AUT has undertaken a project for their *in-situ* and *ex-situ* conservation and sustainable use. It aimed at restoring native species and varieties, increasing the number of farms and the sown area with them, both for family use and for the supply of guesthouses in the area, in favor of the development of agro-tourism in the Albanian Alps area. At the same time, it worked to revive the tradition of cultivating and processing agricultural products (CABRA project and AUT, Contract No: 83226204, 2016-2017).

2.2.2. Animal genetic resources

Factors responsible for the decrease in population size of native/autochthonous animal breeds

Among the most common factors for the decrease in population sizes are:

- Economic factors brought about the low production performances of native/ autochthonous animal breeds is the first and the most important factor leading to genetic erosion of AnGR.
- Decrease in farmers' interest in breeding the animals of local breeds and their replacements with exotic breeds.
- Lack of necessary infrastructures for development the rural and ecotourism.
- Lack of well-organized local markets.
- Import of exotic breeds and an intensive, uncontrolled, crossbreeding process with local breeds.
- Not enough support in regard to the revitalization of the traditional system of production and traditional processing methods of milk, meat, and wool.
- Not enough subsidies and other kind of financial support for farmers that are farming the native/ autochthonous animal breeds.

- Lack of an appropriate awareness on natural resources, animals and rural landscapes from local and national tourist agencies.
- Lack of an appropriate policies to support collaboration amongst farmers.
- Demographic factors - during last 20 years the process of migration of human population from rural areas to urban regions, especially young people, has been intensive.

In-situ conservation efforts

To conserve and protect the breeds from extinction, over the last fifteen years programs for *in-situ* conservation have been implemented. The number of *in-situ*/on-farm conservation programs per species, the number of farms involved in each program, period of implementation (in years), the source of funding, and the implementing institution, are given in Table no.7

Table no. 7. In-situ/on farm conservation programs

Species	Breed	Number of farms	Years	Financial source	Institution
Buffalo	Buffalo	12	2002-2014	GEF/UNDP MoAFRD	Albagene Association CATT-Fushë-Kruja
Cattle	Albanian Prespa cattle	21	2005-2015	GEF/PNUD SAVE Foundation	Albagene Association SAVE Foundation
	Busha strain “Lekbibajt cows”	8	2005-2014	MoAFRD	CAT-Fushë-Kruja Blekalb Foundation
	Busha	32	2008-2015	GEF/UNDP MoAFRD	Blekalb-Foundation CATT-Fushë-Kruja AU-Tirana
Goat	Ecotype "Capore of Mokrra"	12	2014-2016	GEF/PNUD	Blekalb-Foundation
	Ecotype "Capore of Dragobia"	31	2013-2015	French cooperation MoAFRD	AU-Tirana MADA RASP
	Ecotype "Black of Dukati"	8	2010-1012	GEF/PNUD	NASR
Sheep	‘Breed Shkodrane” breed	14	2005-2006 2010-2012	GEF/PNUD MoAFRD	Albagene Association Blekalb foundation CATT –SRS –Korça
	Breed “Lara of Polisit”	10	2013-2016	GEF/PNUD MoAFRD	Blekalb foundation CATT –SRS –Korça
Pig	Native pig "Pig with wattle"	5	2007-2010	GEF/PNUD SAVE Foundation	Albagene Association SAVE Foundation
	Native pig "Spotted of Scutari"	6	2007-2010	GEF/PNUD SAVE Foundation	Albagene Association SAVE Foundation
	Native pig "Siska White of Scutari"	8	2007-2010	GEF/PNUD SAVE Foundation	Albagene Association SAVE Foundation

** CATT- Centre of Agriculture Technology Transfer, SRS-Small Ruminant Station, RASP-Rural Association Support Program, NASR –National Association for Small Ruminant, MADA - Mountain Areas Development Agency, MoAFRD – Ministry of Agriculture, Food and Rural Development, GEF-Global Environmental Facility, AU–Agricultural University*

The *in-situ* conservation programs were compiled and implemented as community-based conservation programs. These *in-situ* conservation programs were focused on: (i) supporting the farmers in establishing farmers' groups, (ii) supporting the improvement of farms' infrastructures, (iii) improvement of the production system, (iv) promotion of native breeds and traditional processing methods and local products. In some cases, subsidies were used as instruments to encourage farmers' economic interest in local breeds at risk of extinction.

Ex-situ conservation efforts

The National Action Plan (MoAF&CP, 2007) for the *Ex-situ* conservation defines, as the first action to undertake, the establishment of the genetic Cryobank for the conservation of somatic cells. The breeds/local farm animal populations are selected for the sample collection. Samples are taken from ear tissues. Actually, a number of samples are in storage conserved in liquid nitrogen (Table no. 8).

Table no. 8 Gene bank Ex-situ conservation of native/ autochthonous breeds

Species	Breed	*Ex-situ* conservation						
		In vivo			In vitro			
					Somatic cell		Semen	
		Number of animal		Gene bank	Number of animal		Doses	Gene bank
		M	F		M	F		
Buffalo	Buffalo	1	3	Zoo	5	25		ATTC-Fushe-Kruja
Cattle	Albanian Prespa cattle	1	4	ATTC -Korça			250 from 3 bulls	ATTC-Fushe-Kruja
		1	5	Private farm				
	Busha strain "Lekbibajt cows"	3	40	Private farms	10	50	750 from 4 bulls	ATTC-Fushe-Kruja
Goat	Ecotype "Capore of Mokrra"	4	55	Private farms	10	50		ATTC -Korça
	Ecotype "Velipoja"	4	35	Rescues Station Private farm				
Sheep	"Shkodrane" breed	8	60	ATTC -Korça	10	50		ATTC -Korça
	Breed "Lara of Polisit"	8	60	ATTC -Korça	10	50		ATTC -Korça
Pig	Native pig "Pig with wattle"	2	6	Rescues Station Private farm				
	Native pig "Spotted of Scutari"	2	4	Rescues Station Private farm				
	Native pig "Siska White of Scutari"	2	6	Rescues Station Private farm				

Given the lack of necessary infrastructure and capacities for oocytes and embryo cryo conservation and, on the other hand, the limited possibilities that have the actual Cryobank to collect and store

somatic cells samples of all native or local species, breeds and ecotypes of Albanian animal genetic resources, it is planned to conserve the native breeds of small ruminant, pigs, buffaloes, rabbits, poultry and cattle. For each native breed of these species it is foreseen to conserve not less than 90 samples of somatic cells, from which 70 samples from female animals and 20 from male animals.

In addition to the Cryobank, the National Action Plan foresees the establishment of the Genetic Bank *Ex-situ in vivo* conservation of breeds/ecotypes/populations at critical status. The establishment of this bank started with conservation of native cattle breed "Albanian Prespa cattle", five cows, and one bull and sheep breeds "Shkodrane" and "Lara of Polisi" respectively in a herd of about 60 animals (50 females and ten males). *Ex-situ in vivo* conservation programs was also implemented in private farms. (Table no.8)

In-situ/*ex-situ* conservation - Obstacles and challenges

The farmers are not organized into breeding associations, which are necessary in order to establish herd books and for the implementation of all other actions in the frame of *in-situ* conservation programs. Their awareness about the value of animal matriculation system and performances control is low. On the other hand, there is not enough public awareness in general and in the farmers' communities in particular, about the values of native/autochthonous genetic pools in farm animals. The low level of economic development of rural areas and not enough financial resources of farmers, also affects the implementation of programs for conservation of native breeds at risk. The support with public funds for the implementation of conservation programs, particularly relevant to *ex-situ* conservation is not enough. There are not the infrastructures in place such as labs and human capacities necessaries for establish the gene bank for *ex-situ* conservation of oocytes, semen, and embryos.

In-situ/*ex-situ* conservation - needs

Referring to the current situation, to strengthen capacity of *in-situ* and *ex-situ* conservation of AnGR, native /local breeds, it is necessary that the Ministry of Agriculture and Rural Development should up-date the Matrix-Plan for implementing the National Action Plan for conservation and development of AnGR, as part of the Sectorial Strategy for Rural Sustainable Development. Along with this it is necessary to make investments to establish the necessary infrastructures and to strength the capacities, at both the national and local levels, in the public and private sectors, for the implementation of both *In-situ* and *Ex-situ* conservation programs.

2.3. SOCIO – ECONOMIC ASPECTS OF AGRO-BIODIVERSITY PROTECTION

In an effort to achieve the objectives for sustainable economic development, the Albanian government has been engaged in developing and implementing policies that have been aimed at increasing the level and quality of life of the Albanian population. The focus of its attention has been and remains the treatment of social and economic problems faced by the population in rural areas of the country, areas where the level of economic development and quality of life is low. Connections and functional interdependencies between the socio-economic problems to be solved as part of the efforts for economic and socio-cultural development of rural areas and the strategic necessity for sustainable conservation and use of agro-biodiversity are addressed in a considerable number of political documents, strategic and action plans. The basic principle on which these documents are based is expressed with the slogan "Used or lost". In order to realize

this slogan, the Albanian government considers it very important to support the establishment and development of institutional and human capacities, along with developing the infrastructure and the cultural behavior towards this national wealth.

The need for and commitment to such developments is conditioned by the necessity for achieving the objectives set out in the policies for the improvement of social economic conditions in rural communities. Consequently, consideration of the socio-economic aspects that are linked and conditioned by the way agro-biodiversity is used in these documents has been given particular attention.

In order to make the most effective and successful efforts to preserve agro-diversity and its use to improve the quality of life in rural communities, the Albanian government have identified the following points as the main ways forward and objectives:

- Support farmers to help them increase the economic efficiency of their efforts primarily expressed through an increase in productions and quality of agricultural products.
- Increase levels of employment, income and living standards of farmers and their households through support and development of agro-tourism and organic agriculture, and to support the efforts for sustainable development of farms and other economic activities in mountain areas by promoting the mountain tourism, and encouraging and supporting the efforts for revitalization of the traditional processing methods of animal production.

Referring to the current situation, the achievements and the trend of efforts to conserve the agrobiodiversity and to use it as a factor that contributes to the enhancement of the quality of life in communities in rural areas, especially in the hill and mountainous regions of the country, the Albanian Government has evaluated the following actions as important, with mid-term perspective: (i) a careful analysis for ranking of the main factors by their impact on agro-biodiversity and agro-environment needs to be carried out. (ii) develop new approaches, and a clearer and systematic reformulation of the agricultural policy concepts. (iii) promotion of traditional and advanced technologies, new techniques and methods of cultivation plant and animal breeding. (iv) preparation of standards for agriculture and agro-processing products according to EU norms. (v) support scientific research, education and advisory services. (vi) establish the training services for farmers. The following points are also important: (i) to improve the agricultural products marketing and to strengthen the capacities of local market. (ii) to support the joint action among farmers and to strengthen the capacities of financial institutions in rural areas. (iii) to up-date the crosscutting strategies and policies and to strengthen the national and local capacities regarding their implementation. (iv) to support the improvement of the supply of energy in rural areas, and (v) to strengthen public - private partnerships.

In order to harmonize the activities in agro-environment and biodiversity conservation it is necessary to strengthen the efforts for implementing the Cross-cutting Strategy of Agriculture and Rural Development 2014-2020.

In the Cross-cutting Strategy of Agriculture and Rural Development 2014-2020, a special place is dedicated to gender equality issues. Strengthening the social and economic position of women in rural areas is one of the important objectives of this strategy. In rural areas, woman account for about 70% of the active labor force, while in entrepreneurship it is only about 7%. The contribution of women to the economy of an agricultural family is important, but this fact does not favor it to have a leading place. Data shows that women are more engaged in farm activities (32% compared to 22% of men), and carry out most of the important agricultural and livestock

activities. Meanwhile, their contribution in decision-making is at an insignificant level. The Albanian government considers gender inequality, which is particularly pronounced in rural areas, as one of the factors that has an adverse effect on the poverty level of these areas. The role of women, engagement and entrepreneurship in rural areas is an important component that is addressed in the Cross-cutting Strategy for Agriculture and Rural Development.

Women are the guardians of agro-biodiversity in general and of the native/autochthonous plant and animal genetic resources in particular. For these reasons promoting and supporting women's participation in conservation programs of these resources and for their economic sustainable use are part of the National Program on Protection and Management of the Plant Genetic Resources and the Albanian Strategy and National Action Plan for the Conservation and Sustainable Use of Animal Genetic Resources.

2.4. STATUS OF PUBLIC AWARENESS

In the Strategy and National Action Plan for conservation and sustainable use of farm genetic resources (PGR and AnGR) the awareness of farmers' communities, the general public, experts and policy makers for its values and promotion of them and their local products are of the utmost importance.

Meanwhile, it is important to emphasize that the commitment to achieving this priority is inadequate. Public institutions responsible for organizing, supporting and carrying out awareness-raising campaigns do not have the necessary infrastructures, financial and human resources. Educational campaigns, as a rule, are implemented in the framework of various projects implemented by NGO's and funded by various (mostly foreign) donors.

Organizing and developing the awareness campaign as an effective, permanent and sustainable activity is very hard work. Public funding to support the sustainability of these activities is limited. NGO's and/or other nonpublic institutions that have as statutory tasks the organization and implementation of awareness raising activities, with limited funds are not able to implement them systematically and sustainably. IPGR and Agricultural Technology Transfer Centers are the main public institutions that have duties and responsibilities to implement awareness-raising and educational campaigns regarding the importance and the economic value of agro-biodiversity. To carry out their responsibilities, these institutions should cooperate with the local structures of the public extension service, with the Agricultural University, NGO's, and the farmers' community.

The main activities that are being developed to raise the level of awareness are:

- Organizing awareness campaigns through the distribution of the messages using electronic and written media, leaflets, posters, and booklets.
    - Organizing activities with the participation of farmers, experts, representatives of different public institution etc., such as:Livestock competitions where animals of native/ local breeds are presented.
    - Fairs with traditional agricultural and livestock products and national or local competitions forthe promoting of native plant and animal genetic resources (such as The annual Fair of Rec, Mountain Day, etc).
    - Field day and/or open farm days to demonstrate traditional breeding techniques in small farm conditions.

  - Field days for the recognition of genetic plant resources, their value and the cultivation of local populations and landraces.
- Organizing seminars, workshops and training activities, at both national and local levels, in order to develop the capacity of public and private institutions, specialists and farmers to implement *in-situ* conservation programs and programs for sustainable economic use of plant and animal genetic resources for agriculture and food.
- Yearly organization of scientific activities like Symposium, Conferences:
  - The European Agrobiodiversity Day.
  - The International Symposium “Biodiversity- conservation and sustainable use for rural development”.


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3. CONCLUSIONS

Albania, thanks to its geographic position and climatic conditions, is a country that is distinguished for its high level of biological diversity in plants and animals for agriculture and food.

Among the main factors responsible for genetic erosion of plant and animal genetic resources, are:

- Decreasing economic interest of farmers due to low yields of local plants and native animals breeds.
- The replacement of local varieties and native breeds with modern varieties (imported varieties and hybrids) and exotic breeds.
- Intensive process of cross-breeding of naive animal breed with exotic breeds.
- Socio-economic changes and demographic migration, abandonment of rural areas, mainly hilly and mountain areas, which are richer in plants and animal genetic resources.

In different regions of Albania, especially in hilly, remote and isolated mountainous areas many small scale farms that use the traditional and/or low input extensive systems of production have survived and together with them several old landraces of crops and native animal breeds.

The systematic collection and preservation of indigenous plant genetic resources is a permanent task in Albania, but there are still areas in which collecting expeditions have not been developed; and several local landraces of crops are still cultivated on “traditional” farms, only.

The up-to-date results for the identification, characterization and cataloging of the agro genetic fund in plants and farm animals have formed a basis for further developing capacities. Nevertheless, it should be noted that the current experiences, the methodology used and the available capacities to develop it, as a continuous process, are insufficient.

Albania is member of different international organizations and has signed and ratified the conventions and international protocols in the fields of conservation and use of biodiversity. In response to FAO recommendations for developing a national capacity needed to elaborate and implement policies and programs for conservation and sustainable economic use of agro-biodiversity, Albania has compiled the National Program and Action Plan for conservation and sustainable use of PGR and National Strategy and Action Plan for conservation and sustainable use of AnGR, as part of a Crosscutting National Strategy for Rural Development. The evaluation of the results achieved so far in the implementation of these political documents evidences the existence of the difficulties and obstacles that have accompanied this process. Among the main factors responsible for this situation are:

- the lack of institutional and laboratory infrastructures
- the insufficient level of human and financial resources
- the low level of a culture of cooperation between public institutions and the farmers’ community.
- insufficient knowledge of conservation and sustainable use of agrobiodiversity.
- a low level of evaluation of economic and cultural values of agrobiodiversity
- the lack of an adequate and effective legal framework, insufficient capacities for establishing an effective international, regional and cross border cooperation, etc.

In Albania there is no national data base for AnGR. Currently, there are no structures and there is no established responsible institution for establishing and up-dating such a database.

The National Plant Genebank has limited capacity (car, camping sets, etc.) for collection missions and support for *ex-situ* conservation.

Public funding for *in-situ*/on-farm conservation of native/autochthonous plant varieties and animal breeds are insufficient. NGO's play a crucial role in the conservation of genetic resources, especially the conservation of animal genetic resources that has so far been dependent on NGO's and individual farmers.

The results obtained for the establishment of the GeneBank for the *ex-situ in vitro* and / or *in vivo* conservation of native animal breeds that are at critical status are modest.

Policies, strategies and action plans for the conservation and sustainable use of agrobiodiversity do not tally with current situations, demands and developments. They have limited capacities to promote, support and realize the expected effects of efforts to conserve, manage and sustain the use of the genetic fund in plant and animal genetic resources for agriculture and food.

The legal framework that regulates and distributes duties, rights and responsibilities to various public and private institutions, at the national and local level, does not fully address the various technical, economic, social, property, etc. issues that are related to the problems, needs and activities that need to be addressed so as to be able to conserve and sustain the use of agrobiodiversity. The legislation is not fully aligned with international and EU legislative frameworks, and with the requirements of international conventions and protocols where Albania adheres to or has ratified.

Conservation and use of old varieties and native animal breeds is frequently based on personal interest of the farmers and their commitment to preserve the native plants and native animal breeds as part of their cultural heritage. In general, there is a lack of proper support for farmers who, for several decades, have cultivated, bred and conserved the local/native plant varieties and animal breeds.

The level of awareness of the great economic and cultural values of agrobiodiversity, awareness and education for participation in the works for its conservation and effective use, is far from the needs of the country and reflects a society's attitude and response that clearly distinguishes itself from the responsibilities it needs to realize.

4. PERSPECTIVES AND RECOMMENDATIONS

4.1. RECOMMENDATIONS FOR THE CREATION AND UPGRADE OF POLICY AND LEGISLATION

Conservation and sustainable use of agrobiodiversity are among the key responsibilities in order to increase agricultural products, and to provide nutrition in quantity and quality for current and future generations. To achieve this, multidimensional actions are needed to reduce as much as possible the effects of the factors causing erosion and the disappearance of the autochthonous genetic fund in plants and animals. Coordination of all efforts and the harmonization of actions between public institutions, policy makers and decision-making bodies at central and local levels, the community of farmers and all other stakeholders, are conditions that determine the success of any intervention for the conservation and sustainable use of agrobiodiversity. Referring to the current situation, the analysis of the results achieved, obstacles, challenges and needs evaluation for the implementation of policies and programs for conservation and sustainable use of agrobiodiversity as a key factor for sustainable rural development, we recommend the following actions:

I. Update the National Program and Action Plan for PGR and the National Strategy and National Action Plan for conservation, and sustainable use of PGR and AnGR. These documents should be compiled in a fashion similar to that of the most important political documents that will ensure a strategic and comprehensive approach to achieving the sustainable use, development and conservation of plant and animal genetic resources, to increase and improve food production and food security, reduce poverty and contribute to rural development. Update of the National Strategy and National Action Plan for PGR and for AnGR, both will be done not as part, but as complementary political documents of Rural Development Strategy. Referring to the international documents, the strategic objectives and aims that will be elaborated in these strategies and action plans should be:

I. Promote the sustainable use and development of plant and animal genetic resources for food security, sustainable agriculture and human well-being.

II. Ensure the conservation of the native varieties plant and animal genetic resource diversity for present and future generations and halt the unintended loss and erosion of these important resources.

III. Promote a fair and equitable sharing of the benefits arising from the use of plant and animal genetic resources for food and agriculture, recognize the role of traditional knowledge, innovations and practices relevant to the conservation of plant and animal genetic resources and their sustainable use and, where appropriate, put in place effective policies and legislative measures.

IV. Meet the needs of farmers, individually and collectively, within the framework of national law, to have non-discriminatory access to genetic material, information, technologies, financial resources, research results, marketing systems, and natural resources, so that they may continue to manage and improve plant and animal genetic resources and benefit from economic development.

V. Promote agro-ecosystems approaches for the sustainable use, development and conservation of plant and animal genetic resources.

VI. Strengthen institutional capacity necessary for regional and international collaborations and

for education, research and training to address the characterization, inventory, monitoring, conservation, development and sustainable use of PGR and AnGR.

VII. Promote activities aimed at raising public awareness and bringing the needs of sustainable use and conservation of PGR and AnGR.

II. Develop an adequate legislation.

Middle-term development of the Albanian legislation relevant to Animal Genetic Resources for Food and Agriculture should aim to do the following:

I. Completion of the legislative framework in accordance with the obligations deriving from the International Conventions and Agreements that Albania has ratified.

II. Approximation of the national legislation with International and EU legislation.

The legislation should be developed as a unique corpus. It should be addressed, adapted and answered in the context of issues related to:

I. Complex nature of biological diversity.

II. Monitoring the agrobiodiversity trend of development and its concomitant effects on the conservation and effective use of the environment.

III. Geo-climatic characteristics and features of different regions of Albania and the specificities of their economic development.

IV. Social, cultural, demographic and traditional conditions, that shall be the background while implementing conservation and sustainable use of AnGR programs.

The issues faced by this legislation should aim at the highest level of approximation with the EU legislation and with the requirements of the international legal framework. Some of them can be ranked as follows:

a. Explanatory provisions for the fundamental concepts used in this Law such as:

Farm animal breed, exotic breed, indigenous, traditional, native, autochthonous, trans-boundary breed, *in-situ*, *ex-situ* conservation method, conservation programs, gene bank, cryconservation, breed improvement, breed standard, breeder organization, conservation organization, herd book, genealogic book, red book, risk status, endangered breed, breed at risk, population size, effective number, genetic distance, genetic material, traditional technology of rearing, etc.

b. Provisions regarding AnGR biodiversity. In these provisions issues that are related to the following should be addressed:

I. Responsible institutions for identification, characterization and monitoring of animal genetic resources for Food and Agriculture.

II. National Information system for monitoring farm animal diversity.

III. Responsible institutions for the administration of the national database.

IV. Cooperation in international farm animal genetic resources databases.

V. National genealogic book, Red book, Herd book, Register of breeds with a zootechnical assessment.

VI. Recognition and registration of new breeds or lines of farm animals: Zootechnical characterization, Molecular genetic characterization, Measurement and assessment of

production and other traits.

VII. Estimation of degree of breed risk and state of use of a breed.

VIII. Education and training in the field of conservation of farm animal genetic resources.

IX. Raising public awareness and early warning on the state and significance of conservation of genetic farm animal resources.

c. Provisions for evaluation and monitoring of genetic variability, such as:

I. Criteria for the estimation of genetic variability within breeds.

II. Monitoring and assessment of genetic variability for individual breeds.

III. Monitoring and assessment of inbreeding and degree of relationship for individual breeds.

IV. Calculation and determination of genetic reserves by types of genetic material.

V. Ensuring and maintenance of genetic reserves of species, breeds and lines of farm animals.

VI. Breeding programs for commercial breeds, exotic and native breeds, small populations.

d. Provisions for drafting and implementing conservation programs for animal breeds at risk of extinction:

I. *In-situ* conservation.

II. *Ex-situ* conservation.

III. National gene bank-cryo bank, *ex-situ in vivo* bank.

IV. Rule of Subsidies.

e. Provisions relevant to Convention on Biodiversity (CBD) and Nagoya Protocol (ABS):

I. Genetic Resources Access and benefit-sharing.

II. Traditional knowledge access and benefit-sharing, trademarks and patents for traditional livestock products.

III. Prior informed consent by indigenous and local communities.

IV. Monitoring and enforcement.

f. Provisions relevant to Livestock Keepers' Rights or Farmers' Rights:

I. Property Rights - Ownership of the Individual Animals.

II. Transferring an Existing Right to another Person.

III. Intellectual Property Rights.

g. Provisions for institutional, policies and capacity –building, such as:

I. Establish a National Network, National coordinator and National Focal Point for animal genetic resources for food and agriculture.

II. Establish a National Agency for Farm management of AnGR.

III. Support research activities.

h. Provisions for International cooperation in the field of conservation and use of AnGR.

i. Provisions for financial sources.

4.2. RECOMMENDATIONS FOR IMPROVEMENT OF THE INSTITUTIONAL CAPACITIES

I. Establish and maintain the National database for native/autochthonous/local animal breeds.

The adequate data and information are necessary to demonstrate and explain to policy-makers and the general public the need to invest in the better management of animal genetic resources. Inventorying and characterizing animal genetic resources, monitoring trends and risks associated with them, should be a continuous process. To carry out this process it is necessary to:

I. Establish a public institutional unit and support to build their infrastructure for monitoring trends in animal genetic resources (for example population size and genetic diversity), including identification, registration and pedigree systems.
II. Develop technical standards and protocols for phenotypic and molecular characterization.
III. Strengthen research and development of methods for characterization, and breed evaluation, valuation and comparison.
IV. Promote participatory approaches for characterizing, inventorying and monitoring of trends and associated risks that foster collaboration among all stakeholders, including livestock keepers and researchers.

II. Building and/or strengthening institutional capacities at national and local levels that are necessary to implement the programs for conservation and sustainable use of PGR and AnGR.

Regarding the animal genetic resources for agriculture and food recommendations include:

I. Establishment of a National Advisory Committee as the ad-hoc institution having the authority to declare breeds at risk of extinction.
II. Institutionalization of National Focal Points for AnGR.
III. Support the revitalization of the National Network responsible for the management and conservation of farm animal genetic recourses.
IV. Building a National Agency for AnGR as a public institution responsible for conservation, management, and use of AnGR.
V. Promote cooperation and synergy action between the different authorities and stakeholders, within and across ministries, central and local public authorities and public and private agencies.

4.3. RECOMMENDATIONS FOR IMPROVEMENT OF AGRO-BIODIVERSITY CONSERVATION

I. Develop the effective tools for implementation of national and local programs for on-farm conservation of native/local plant varieties and animals' breeds that are at critical or at risk status. Support the implementation of *in-situ* and on-farm conservation programs, through:

I. Financial support directly for farmers that maintain and grow the landraces and native varieties or breed the native animal breeds.
II. Encouragement of farmers and breeders' organizations, community-based conservation organizations, non-governmental organizations and other actors to participate in conservation efforts.

III. Support of the Gene Bank with a financial fund, tools and equipment to meet the time requirements for *ex-situ* and on-farm management of plant genetic resources.

II. Establish *ex-situ* conservation programs, building and management of the National Genetic Bank, *ex-situ in vivo* and Criobank, for native/indigenous animal breeds.

4.4. RECOMMENDATIONS FOR IMPROVEMENT OF THE SCIENTIFIC AND PUBLIC AWARENESS

I. Strengthen national educational and research facilities. To achieve this it is necessary for the following to take place:

I. Identification of the short-term, medium-term and long-term needs for research and education, and promote the formation of the relevant experts.

II. Review national research and education capacities in relevant fields, and establish targets for training to build the national skills base.

III. In partnership with other countries, strengthen the capacities of the Agricultural University, research and training centers, revitalization of the public and private extension services at national and local levels.

4.5. RECOMMENDATIONS FOR IMPROVEMENT OF REGIONAL COOPERATION

I. Strengthening international co-operation through:

I. Establishment of a Committee for Cross-Border and Regional Cooperation for the Conservation and Use of Agrobiodiversity with the participation of representatives of decision-making institutions, farm communities and other stakeholder.

II. Capacity building to support implementation of cross border programs and projects for conservation, management, and use of agrobiodiversity, and in particular for trans-boundary breeds and plant varieties.

III. Organization of periodic activities for sharing scientific research experiences in the fields of conservation and sustainable use of agrobiodiversity.

II. Raise national awareness of the roles and values of agrobiodiversity. Provide targeted, effective information through media, public events, and other means to raise awareness about the important roles and values of plant and animal genetic resources. This should address their specific characteristics and the consequent special policy needs for their sustainable use, development and conservation, including maintainers' contributions, needs, and all relevant rights that may exist at the national level. Target audiences include policy-makers, all major stakeholders within the agricultural sector and related sectors, and the general public.

5. CASE STUDIES

Use of landraces for their sustainable use - “Sulova” maize landrace

"Sulova" is an Albanian landrace of maize (Zea mays L.) with very brilliant white kernels, whose production is entirely utilized as flour. It represents a niche crop with important social and economic significance for local people. This landrace (LR) originated from an ancient source and has been grown in the Sulova area since the 17th century. For centuries, Sulova has been known for the maize cultivation with the same name, with a low yield of 2.0 tons per ha, but preferred for its bread quality. It has a short cycle, about 80 days. "Sulova" corn is actually grown on about 300-350 ha, in the hilly areas, mainly in the province of the same name, but also in other surrounding areas. Most farmers sow it in small parcels, about 0.1 - 0.3 ha. The overall production of “Sulova" has increased from 100 tons in 1990 to 1,200 tons present and its total market value from about 30,000 to more than 350,000 euro. It is still well-known at the local level and fully appreciated as corn for bread, but also for the preparation of ballokume (a local dessert); its demand shows a steady increase due to increased customer attention; maize grown according to traditional agronomic practices using low inputs.

The local production of LR (Sulova) has greatly contributed to its on-farm conservation through the continued cultivation and management by farmers in the agro-ecosystem where it has evolved.

"Sulova" LR is also registered in the Official Catalog of Species and Varieties, that of "conservation varieties", that helps maintain LR on-farm and in linking the LR to its territory of origin. Overall, it is a fine example of successful on-farm conservation and use of a LR in Albania.

In-situ conservation of the native pig breeds

The field missions that was carried out in the Velipoja region during the 2005 identified three native pig breeds: Siska white of Scutary, Spotted of Scutary, and Pig with wattle. The breeds are marked as being in critical status. Among the factors that affected this situation were:

- Low economic interest of farmers to breed these native pig breeds.
- Lack of a local market.
- Lack of farmers' organization and program for conservation and development of local pig breeds. As a result, selection of reproducers, drafting and monitoring mating schemes, prevention of crossbreeding phenomenon (boars come from Montenegro) was almost impossible.

Activities and objectives of *in-situ* conservation program:

- Implementation of urgent measures, necessary to stop the process of genetic erosion, and decrease in the size of the population.
- Establish a farm where breeding four to five sows and one to two boars for each native breed, that will serve as a nucleus heard for in–situ / on farm conservation and as a Rescues Centre.
- Support collaboration among farmers, building up and strengthening the capacity of Local Network of Farmers to support *in-situ*/on-farm conservation.
- Capacity building to support the marketing of meat.

After two years:

The size population had quadrupled. Three nucleus farms had been established. The price of pig meat had risen by 80-90% higher than usual. The demands of consumers for this product had also increased. The main part of the meat production was dedicated and focused on Velipoja's tourist market. Interest of farmers to breed native pig breeds, not only in Velipoja region but farmers from other regions, had also increased.

Best Case - Conservation of AgroBiodiversity in Rural Albania (CABRA)

CABRA is a GIZ project which uses an integrated approach to conservation and sustainable use of agrobiodiversity in Albania. Establishment of regional nature parks (i.e Shkrel and Nikaj-Mertur) and their management plans and system was geared towards development of protected areas with a component aimed at mainstreaming agrobiodiversity (https://www.giz.de/en/worldwide/20445.html) Direct measures for conservation of agrobiodiversity strengthened the capacity of the IPGR for *ex- situ* conservation through improved practices and equipped Gene bank infrastructure to run regular surveys, planting and restoration of cultivars and to carry on *in-situ* measures supporting capacities of farmers to create a network supporting them with technical assistance and providing them with 25 landrace and local varieties during 2016 and 2017. Furthermore, as an example in support of tourism as an incentive for conservation and sustainable use of agrobiodiversity (https://www.giz.de/expertise/downloads/giz2015-en-agrobiodiversity-factsheet-collection.pdf). CABRA supported the nature and rural tourism product development linking with direct marketing such as itineraries in nature parks, chestnut trail, supporting short chains through tourist consumption and *in-situ* selling points such as promotion of fairs, weekend markets, and promotion of agrobiodiversity days in nature parks.

http://www.albaniantravel.info/AlbanianTravel/tradita/item/agrobiodiversiteti-shqiperia-ka-nevoje-te-zhvilloje-turizmin-e-eksperiencave

Case study – corn products in Albania

In the central part of Albania, the 14th March, known as "Summer Day" has been celebrated since ancient times to honor nature and its fruits. One of the most prominent signs of the celebrations is a dessert called “ballakumes” made of corn flour from a local corn race called “Sulova” that has been known for centuries and is still cultivated on over 300 ha in the villages of the region of Sulova and is a favorite landrace, because of its specific taste. Similarly, in the northern part of the country, the corn flour from the variety “Reçi" is cultivated in over 200 ha and used for the preparation of a special bakery product that is served with fermented milk. Despite its low yields the overall production of “Sulova” has increased from 100 tons in 1990 to 1,200 tons at present and this increase has greatly contributed to its on-farm conservation. These examples show how traditional festivities and special gastronomic specialties can help preserve local varieties of high quality.

Best practice – Developing strategies and practices for conservation of the autochthonous breeds in Albania

A pilot project is currently under the implementation of CABRA in Albania , supporting a network of livestock farmers, from six local landraces, two of them in risk status (“Scutary” sheep and “Kallmeti” goat). The project focuses on developing strategies for conservation, applying herd books for farms, monitoring for reproduction and production performance, improved exchange among farmers for genetic material, also preparing the farmers to fulfill conditions for upcoming agro-environment EU IPARD incentive schemes.

Best case - Promotion of agrobiodiversity values in media and fairs (CABRA project in Albania)

Agrobiodiversity promotion days were examples of a combination of tourism promotion and awareness raising, integrating the demonstration of livestock and plant landraces, presentation of conservation measures by the Gene Bank, fair presentation of local products, and visits to a chestnut forest, etc. Yearly events were organized by CABRA in Shkreli Regional Nature Park (October 2016, November 2017).

http://top-channel.tv/video/parku-natyror-i-shkrelit-projekti-gjerman-per-nxitjen-e-turizmit/

http://www.monitor.al/rec-aty-ku-agroturizmi-dhe-geshtenjat-po-pasurojne-fshatin/

The Albanian Institute of Plant Genetic Resources in cooperation with the CABRA project during 2016-2017 has assisted in four TV programs for local landraces. https://www.youtube.com/watch?v=LGgWztQqMlQ

ANNEX 1

STRUCTURE OF AGRICULTURAL PRODUCTION

Agricultural area by categories of use (in '000 hectares)

Year	Agricultural area	Cultivated land						
		Total	Arable land and gardens	Orchards	Vineyards	Olive trees	Nurseries	Pastures
2011	1,201.0	695.8	621.3	18.0	10.1	45.6	0.8	505.3
2012	1,201.0	696.0	605.0	23.0	11.0	56.0	1.0	505.0
2013	1,201.0	696.0	604.0	23.0	12.0	56.0	1.0	505.0
2014	1,202.0	697.0	603.0	23.0	14.0	56.0	1.0	505.0
2015	1,202.0	697.0	603.0	23.0	14.0	56.0	1.0	505.0

Source: Ministry of Agriculture, Rural Development and Water Administration, Statistical Office, 2016

Arable land by categories of use (in '000 hectares)

Year	Arable land and gardens	Sown area								Other arable land
		Total	Cereals	Industrial crops	Vegetable crops	Potatoes	Beans	Fodder crops	Other crops	
2011	621.3	409.0	147.7	2.7	30.6	9.5	14.7	204.0	-	212.3
2012	605.0	409.8	143.0	2.7	31.0	9.3	14.9	208.9	-	195.0
2013	604.3	413.3	142.1	2.4	30.0	9.1	14.5	215.3	-	191.0
2014	603.0	409.8	143.2	2.2	30.0	9.6	14.8	204.2	5.0	193.0
2015	603.0	413.1	142.6	1.9	31.0	10.1	15.1	207.3	5.0	190.0

Source: Ministry of Agriculture, Rural Development and Water Administration Statistical office, 2016

Livestock, poultry and beehives (in number, 000 heads)

Year	Cattle		Pigs		Sheep		Goats				
	Total	Cows and heifers in calf	Total	Sows and first farrow sows	Total	Ewes for breeding	Total	Milked goats	Horses	Poultry	Beehives
2011	492	354	161	12	1,699	1,324	818	605	99	9,292	233
2012	498	358	159	12	1,799	1,392	820	612	97	9,494	239
2013	498	356	152	12	1,856	1,426	867	643	93	8,928	246
2014	499.6	358	172,4	12	1,940	1,463	872	651	91	9,493	261
2015	50.2	357.1	171.4	11.4	2,815	1,458	875	659	91	8,558	271

Source: Ministry of Agriculture, Rural Development and Water Administration Statistical Office, 2016

ANNEX 2

LIST OF INSTITUTIONS AND GOVERNMENTAL BODIES

Institution	**Ministry of Agriculture and Rural Development (MARD)**
Contact details	http://www.bujqesia.gov.al
Role in agrobiodiversity protection	Responsible institution for the creation of policy and legal documents and their implementation.
Capacity assessment (human and infrastructure)	It is not sufficiently efficient in conservation of agrobiodiversity, especially for PGR. There is the General Directory of Agricultural Policies (GDAP), which prepares regulations focusing on conservation and management of agrobiodiversity, that legally encourages support for autochthonous plants according to typical cultivation areas, certified "BIO" products, cultivated medicinal plants, etc. The coordination and supervision of actions concerning genetic resources in agriculture, such as activities for "on-farm" conservation and using of PGR have to be directed through the Directorate of agricultural and livestock production (DALP) and the State Institute for Seed and Saplings (SISS), but their activities are mainly focused on seed issues, mainly for seed varieties that are used for agricultural production, and the National List of Varieties are maintained.
Important specific actions undertaken by the institution	DALP and SISS put some efforts to work on the Program for protection of autochthonous varieties according to the EC regulative, but this process was stopped recently.
Requirements for further enhancement of capacities	The activities of the DALP and SISS need to be redirected towards conservation and sustainable use of PGR.

Institution	**Ministry of Tourism and Environment (MTE)**
Contact details	http:// www.mjedisi.gov.al
Role in agrobiodiversity protection	Responsible institution for creation of policy and legal documents and their implementation. The Ministry establishes the main goals for biodiversity protection, prepares programs and strategies for their implementation, establishes new regulations on this field and coordinates the implementation of the National Strategy.
Capacity assessment (human and infrastructure)	It is in charge of the sustainable use of natural resources, protection of nature and biodiversity, sustainable development and management of forestry and pastures, etc. All activities for PGR legally have to be directed through the Directorate of Biodiversity and Protected Areas (DBPA), but their activities are mainly focused on wild flora.
Important specific actions undertaken by the institution	DBPA put some efforts to work on the Program for protection of autochthonous varieties according to the EC regulative, but this process has been limited over the last few years.
Requirements for further enhancement of capacities	The activities of the DBPA need to be redirected towards conservation and sustainable use of PGR of CWR and cultivated crops.

Institution	**Institute of Plant Genetic Resources** *(part of the Agricultural University of Tirana)*
Contact details	Address: Street "Siri Kodra", 132/1, Tirane, Albania; http://qrgj.org Email: albgenebank@ubt.edu.al; Email: elezi_fetah@ubt.edu.al
Role in agrobiodiversity protection	Inventorying, collecting, missions, characterization, phenotypic and characterization, evaluation, documenting and storing of PGR, research projects for sustainable use of PGR, education with course programs at PGR at undergraduate and postgraduate level, elaboration of M.Sc. and Ph.D. thesis on PGR, contributions to policymakers for the preparation of legal acts, participation in creation and implementation of governmental policy on PGR, participation in elaboration of strategy documents (studies, strategies, programs and action plans on biodiversity), etc.
Capacity assessment (human and infrastructure)	16 employees, out of which 11 are Ph.D. holders, field trials, various laboratories for phenotypic, agronomic and qualitative PGR analysis, laboratory of "in-vitro", inventory collection of seed samples, gene bank with 16 vertical freezers for long-term storage condition(-18° to -20°C), cold room(0-5°C) of active collection, greenhouses, ten ha of field collections of fruit tree crops, etc.
Important specific actions undertaken by the institution	Inventory and collecting of PGR of ex-agricultural research institutes in 1998-2002 (funded by USAID and by the World Bank). Participation in SEEDNet project on conservation and sustainable use of PGR in 2004-2011 (funded by SIDA). Inventory and collecting of PGR in 2013-15 (funded by FAO); Establishment of the National Coordinative Council on PGR, 2015. Establishment of Farmers Network for on-farm conservation and sustainable use of local varieties. Establishment of field collections of fruit trees, olives and grapes. Conservation and sustainable use of agrobiodiversity in the Northern Alps of Albania (2016-2017, funded by GIZ); Characterization, evaluation, regeneration and documentation of some acc. of PGR.
Requirements for further enhancement of capacities	According to the needs identified, for field work material and equipment, needed support for are: • Monitoring of the on-farm areas (GPS, binoculars, computers, etc.). • Patrolling (car, camping sets, etc.). • Awareness raising (projectors, promotional materials, etc.). • Increase the capacity for long-term storage condition at the National Gene Bank (Freezers are urgently needed for storing seed collections). • Financial support for regeneration and multiplication of the PGR collection.

Institution	**Agricultural Technology Transfer Centre of Fushe-Kruja**
Contact details	Address: Bulevardi Palmave, Lushnjë, Albania; Tel/Fax: +355 35222498; E-mail: qttblushnje@yahoo.com
Role in agrobiodiversity protection	This center (situated in central Albania) is responsible for researching and transferring technologies for fodder crops, beans, bovine, pigs, poultry and farm management. It is also responsible for inventorying, collecting, evaluation, and storing of fodder crops and beans' PGR; conservation of the autochthon genetic resources of the bovine, pigs and poultry AnGR; participation in research projects for sustainable use of PGR and AnGR, participation in elaboration of strategy documents (studies, programs and action plans on biodiversity).
Capacity assessment (human and infrastructure)	51 employees, out of which 27 hold Ph.D.'s, field trials, various laboratories for phenotypic, agronomic and qualitative PGR and AnGR analysis, working collection of seed samples.
Important specific actions undertaken by the institution	Participation in SEEDNet project on conservation and sustainable use of PGR in 2004-2011 (funded by SIDA). Inventory and collecting of PGR in 2013-15 (funded by FAO). It has offered two innovations: the autochthon genetic resources of the Illyric Dwarf Cattle (Busha Type) of Lekbibaj – Tropoje and the sustainable conservation of the alfalfa's native variety through the selection and certified seed production *in-situ*.
Requirements for further enhancement of capacities	The dark and cold room is needed for storing of seed collection, financial support for multiplication of the PGR collection with: a) Patrolling (car, camping sets, etc.). b) Awareness raising (projectors, promotional materials, etc.).

Institution	**Agricultural Technology Transfer Centre of Lushnja**
Contact details	Address: Fushë-Krujë, Albania; www.qttb-fk.org Tel/Fax: +355 51124356; E-mail: qttbfushekruje@yahoo.com
Role in agrobiodiversity protection	This center (situated in west-coastal area of Albania) is responsible for researching and transferring technologies for vegetable crops, wheat and on-farm management. It is also responsible for inventorying, collecting, evaluation, and storing of vegetable crops, wheat and common beans' PGR; participation in research projects for conservation and sustainable use of PGR, participation in elaboration of strategy documents (studies, programs and action plans on biodiversity).
Capacity assessment (human and infrastructure)	20 employees, out of whom 4 hold Ph.D.'s, field trials, greenhouses, cold room various (4-60C and RH25-30%) of collection storage, laboratories for phenotypic, agronomic and qualitative PGR analysis, working collection of seed samples.
Important specific actions undertaken by the institution	Participation in SEEDNet project on conservation and sustainable use of PGR in 2004-2014 (funded by SIDA). Regeneration and Safety Duplication of Regionally Prioritized Crop Collections(Project Ref. No.: GS09011; Duration 2009-2010, funded by Bioversity International, Rome, Italy). 225 accessions of beans were regenerated; Collecting the Crop Wild Relatives of the Albania's Umbellifer Crops(LoA 13/032;Duration 2013-2014, funded by Bioversity International, Rome, Italy). There were collected 34 accessions of 13 Umbellifer crops.) Inventory and collecting of PGR in 2013-15 (funded by FAO).
Requirements for further enhancement of capacities	Financial support for multiplication of the PGR collection with: a) Patrolling (car, camping sets, etc.). b) Awareness raising (projectors, promotional materials, etc.).

Institution	**Agricultural Technology Transfer Centre of Shkoder**
Contact details	Address: Dobraç, Shkodër, Albania: Phone: +355 2 251 200; Email: qttbshkoder@yahoo.com
Role in agrobiodiversity protection	This center (situated in north Albania) is responsible for researching and transferring technologies for maize, medicinal and aromatic plants, and on-farm management. It is also responsible for inventorying, collecting, evaluation, and storing of maize, medicinal and aromatic plants' PGR; participation in research projects for conservation and sustainable use of PGR, participation in elaboration of strategy documents (studies, programs and action plans on biodiversity).
Capacity assessment (human and infrastructure)	17 employees, out of whom three are Ph.D. holders, field trials, various laboratories for phenotypic, agronomic and qualitative PGR analysis, working collection of seed samples.
Important specific actions undertaken by the institution	Participation in SEEDNet project on conservation and sustainable use of PGR in 2004-2014 (funded by SIDA). Inventory and collecting of PGR in 2013-15 (funded by FAO).
Requirements for further enhancement of capacities	Financial support for multiplication of the PGR collection with: a) Patrolling (car, camping sets, etc.). b) Awareness raising (projectors, promotional materials, etc.).

Institution	**Agricultural Technology Transfer Centre of Korça**
Contact details	Address: Rruga e Voskopojës, Korçë-Albania; Phone: +355 8 2254 950; Email: qttbkorce@yahoo.com
Role in agrobiodiversity protection	This center (situated in south-east Albania) is responsible for researching and transferring technologies for seedy fruit trees (apples), potatoes and barley plants, small ruminants, and on-farm management. It is also responsible for inventorying, collecting, evaluation, and storing PGR and AnGR; participation in research projects for conservation and sustainable use of PGR and AnGR, participation in elaboration of strategy documents (studies, programs and action plans on biodiversity).
Capacity assessment (human and infrastructure)	18 employees, out of whom 3 hold Ph.D.'s, field trials, various laboratories for phenotypic, agronomic and qualitative PGR analysis, field collections of fruit trees and working collection of seed samples.
Important specific actions undertaken by the institution	Participation in SEEDNet project on conservation and sustainable use of PGR in 2004-2014 (funded by SIDA). Inventory and collecting of PGR in 2013-15 (funded by FAO). Establishment of field collection of seedy fruit tree crops (apples).
Requirements for further enhancement of capacities	Financial support for multiplication of the PGR collection with: a) Patrolling (car, camping sets, etc.). b) Awareness raising (projectors, promotional materials, etc.).

Institution	**Agricultural Technology Transfer Centre of Vlora**
Contact details	Address: Shamogjin, Vlorë, Albania; Phone/Fax: +355 3 323 225; Email: qttbvlore@yahoo.com
Role in agrobiodiversity protection	This center (situated in south Albania) is responsible for researching and transferring technologies for nuclei fruit trees, olive trees, vineyards, citrus, and on-farm management. It is also responsible for inventorying, collecting, evaluation, and storing PGR; participation in research projects for conservation and sustainable use of PGR, participation in elaboration of strategy documents (studies, programs and action plans on biodiversity).
Capacity assessment (human and infrastructure)	24 employees, out of whom 6 hold Ph.D.'s, field trials, screen houses and modern greenhouses used to grow olive seedlings; various laboratories for phenotypic, agronomic and qualitative PGR analysis, field collections of fruit trees, olive trees, vineyards and citrus.
Important specific actions undertaken by the institution	Participation in SEEDNet project on conservation and sustainable use of PGR in 2004-2014 (funded by SIDA). Inventory and collecting of PGR in 2013-15 (funded by FAO). It has offered two innovations: i. Production and multiplication of vegetative material certified for nurseries. ii. Establishment of field collections of fruit crops (nuclei fruit trees, olive trees, vineyards and citrus).
Requirements for further enhancement of capacities	Financial support for multiplication of the PGR collection with: a) Patrolling (car, camping sets, etc.). b) Awareness raising (projectors, promotional materials, etc.).

Institution	**National Agency of Protected Areas in Albania(NAPA)**
Contact details	http://www.akzm.gov.al Address: Norbert Jokl KP:1000, Tirana, Albania; Tel: +355 4 225 81 20/ +35542225068; Email: info@akzm.gov.al
Role in agrobiodiversity protection	National Agency of Protected Areas, that was founded by the Council of Ministers, Decision No. 102, date 04.02.2015, aimed at the management, protection, development, expansion and operation of the protected areas in Albania, which today account for about 16% of the territory of Albania. NAPA manages the network of protected areas and other natural networks as Natura2000 under management plans. NAPA monitors flora and fauna in these areas. NAPA cooperates with Albanian and foreign experts operating in the field of environment within the research, development and management of protected areas, nature in the Republic of Albania. Manages the network of protected areas. Designs and implements the management plans for protected areas. Proposes changes and improvements to the legal framework for management of the PA.
Capacity assessment (human and infrastructure)	National Agency of Protected Areas has a staff of 224 people, of which 20 in the central office and 204 in the Regional Administration of Protected Areas.

Important specific actions undertaken by the institution	**The network of marine and coastal protected areas (Duration: 2011 – 2016; Financed by GEF / UNDP , MM**): 1. Preparation of the strategic plan for marine and coastal areas by focusing on expansion, with a ten-year vision; 2. Establishment of a single monitoring system, the ZMDB , to be applied at the local level, especially monitoring of Karaburun - Sazan; 3. Prepare a guidance document for the establishment of a financing system for marine protected areas and coastal; 4. Support for capacity building for protected areas management, business plans, etc; **Conservation of Agrobiodiversity in Rural Albania (CABRA), (Duration: 2012 – 2017; Funded by GIZ)**. The activities aim to halt the loss of biodiversity and increase the diversity of domestic animal and plant species in the Northern Alps, Albania. For this to be successful, people must recognize their value and benefit from them. This is particularly the case for impoverished rural areas where many inhabitants have left their homes because they saw no economic prospects. If these areas were to stimulate higher earnings and if ownership and use rights of natural resources were strengthened, biodiversity would almost likely be better protected. Therefore, and to increase the overall value of the region, CABRA is promoting sustainable mountain tourism, agriculture and other businesses that create both economic and environmental benefits. **Conservation and Sustainable Use of Biodiversity at Lakes Prespa, Ohrid and Shkodra (CSBL); (Duration: 2014-2017: Financed by European Union,MM)**: 1. Strengthening cross-border cooperation platform for Lake Ohrid and the opportunities for tourism growth. 2. The process for the realization and recognition of the whole area of the lake as a World Cultural Heritage site. 3. Implementation of the campaign for the reduction of waste through the activities. **Preparation of the National Forest Inventory (Duration: 2015-2019; Financed by IBRD, GEF , SIDA , MM)**: 1. Preparation of a change in the findings of the National Forest Inventory, to provide information on how the volume of forest coverage during the period specified for interference has changed. 2. Support for forest management planning that is managed by the state (excluding PA). 3. Establishment of Information System for Albanian Forests (AIFIS). 4. Registration of Forests and Pastures. 5. Promotion of rural income through value chain analysis and preparation of forest products processing and marketing plans in the short- and medium-term. **Research and development of recommendations for the best way to enable information to people taking into account gender differences in employment and civil participation (Duration: July 2015 - July 2019; Financed by GEF**): 1. Research and development of recommendations for the best way to enable information to people inside or around PAs taking into account gender differences in employment and civil participation 2. Draft recommendations for collecting data and environmental sustainable in the longer term as well as discussions with government institutions. 3. Enabling the logistical and technical support as necessary, including training and manual of use of the information placed in the center of the Information Centre of the Ministry of Environment.
Requirements for further enhancement of capacities	According to the needs identified by the National Agency for Protected Areas and the Ministry of Environment, field work material and equipment for: a) Monitoring of the project areas (GPS, binoculars, camera traps, water analysis instruments, computers, etc.). b) Patrolling (car, camping sets, etc.). c) Awareness raising (projectors, promotional materials, etc.).

ANNEX 3

LIST OF ENVIRONMENTAL NGO'S THAT HAVE BIODIVERSITY AS A PRIORITY

Nr	Non-Governmental Organizations
1	Association for Plant Genetic Resources (APGR): Address: Street: Fran Bardhi; P-12; Ap.15; Tirana, ALBANIA; www.webmail.apgr.al ; Tel: +355 44 514807 ; Mob: 062409080; E-mail: shoqataapgr@gmail.com//info@apgr.al/
2	Regional Environment Center (REC), Tirana: Street "Ismail Qemali", No. 27, Floor 3, Tirana, Albania. albania.rec.org Phone: +355 4 223 2928. Fax: +355 4 223 2928. Email: rec.albania@rec.org. Postal address: PO Box 127, Tirana, Albania
3	Protection and Preservation of Natural Environment in Albania (PPNEA). Address: Street. "Vangjush Furxhi" p.16 / sh.1 / a.10 , Tirana, Albania; www.ppnea.org/ ; Phone: +355 4 2256 257; Fax: +355 4 2256 257; E-mail: contact@ppnea.org
4	ECONORD; Address: Bulevardi Bajram Curri, Rr.Shyqyri Ishmi, Pll. "Shpresa", Tirane, Albania. Phone: +355 4 45 18 628; http://econord.alcdf.org/; Email: info@alcdf.org
5	Institute for Nature Conservation in Albania (INCA) ; Address: Street "Islam Alla", Pallati IVEA, Kat I, Tirana, Albania; Web : www.inca-al.org/index.php/en/ Phone Number: +355 42231437; e-mail: info@inca-al.org
6	Biologic Agriculture Institute(IBB); Rr. "Tirana", Shkozet – Durrës ; www.ibb.al E-mail: eisufi@ibb-albania.org
7	Bioplant Albania; Address: Street: "Atë Stath Melani", Build 67/2, Lagja e re "Misto Mame"; Tel: 0692716175.
8	ALBAGENE – National Association for Conservation and Use of AnGR. Address: Rr. Abdyl Frasheri" No. 3, Tirana. www.albagene.org
9	Rural Association Support Program (RASP). Address: Rruga "Dritan Hoxha", Pall. "TeknoProjekt", Shk.2, Ap.28 PO.Box 2415/1, Tiranë 1001 office@rasp.org.al, http://rasp.org.al/index.html
10	BLEKALB Foundation – Science, Technology , Extension Service for Farm`s Development. Address: Rr. "Abdyl Frasheri" Pall 3/3 Ap. 5 Tirana. www.blekalb.info

ANNEX 4

A. LIST OF NATIONAL LAWS

1. Law No. 8906/2002, “On protected areas” amended by Law No. 9868/2008 “On some addendums and changes in Law No. 8906, date 06.06.2002 “For protected areas”;

2. Law no. 7802/2002 “On identification and registration of animals and farms”’, Official Journal no. 47/2000, (as amended by Law no. 66/2013);

3. DCM no. 320/2008 “On the animal identification system and the registration of farms”, Official Journal no. 49/2008, (as amended by DCM no. 198/2009 and DCM no.381/2009);

4. Regulation no. 1/2002 “On the system for the identification and registration of the animals and the livestock enterprises”;

5. Law no. 9426/2005 “On livestock breeding”, Official Journal no. 78/2005 (as amended by Law no. 9864/2008; Law no. 10137/2009; Law no. 72/2013);

6. 6. DCM no.1708/2008 “On the implementation of the programs for *in-situ* protection of autochthon ruminants”, Official Journal no. 208/2008;

7. Law no. 7659/1993 “On seeds and seedlings”, Official Journal no. 1/1993;

8. Instruction of the Minister no. 620/2005, “On the variety structure of the seedlings and seeding material of the imported or domestic produced grapevine”, Official Journal (not identified);

9. DCM no. 530/2013 "On the criteria for marketing and certification of vegetable sowing and multiplication materials, except of seeds";

10. Law no. 7929/1995 "On the protection of fruit trees”, Official Journal no. 12/1995;

11. Law no. 8880/2002 "On the rights of the plant breeder"(as amended by Law no. 68/2013)

12. Law No. 10416/2011,"On planting and multiplicative plant material”, (as amended by Law no. 67/2013, date 14.02.2013 and Law no. 105/2015, date 1.10. 2015);

13. DCM no. 409/2013 “On establishment of the criteria for marketing and certification of the seeding material for grapevines”, Official Journal 86/2013;

14. Law no. 9587/2006 “On protection of biodiversity”, Official Journal no. 84, (as amended by Law no. 37/2013; Law no. 68/2014);

15. DCM no.31/2016 “On the approval of the Policy Paper for the protection of biodiversity ".

16. Law no. 9817/2007 “On agriculture and rural development”, Official Journal no. 147/2007;

17. DCM no. 86/2013 "On the criteria for trading, certification and testing for cereals seeds";

18. DCM no. 87/2013 "On the criteria for trading, certification and testing for forage seeds";

19. DCM no. 240/2013 "On the criteria of marketing and certification criteria of multiplication materials and saplings of fruit trees".

20. DCM no. 332/2013 "On the criteria of marketing and certification criteria for vegetable seeds".

21. DCM no. 409/2013 "On the criteria of marketing and certification criteria of multiplication materials and saplings of grapes".

22. DCM no. 530/2013 "On the criteria for marketing and certification of vegetable sowing and multiplication materials, except of seeds";

23. DCM n. 709/2014 approving the Intersectorial Strategy for Rural and agricultural Development. Official Journal 169/2014;

24. MoARDWA: Rural Development Programme 2014-2020, under Instrument for Pre-Accession Assistance (IPA); 28 May 2015;

25. Law nr. 9734/2007 "On Tourism";

26. Law No. 9863/2008 "On the Food";

27. Law No.9867/2008, "On rules and procedures for international trade of endangered species of flora and fauna";

28. Law No. 10006/2008, "On Wild Fauna Protection";

29. Law nr. 10119/.2009 "For spatial planning";

30. Law no.10120/2009, "On protection of medicinally plants' fund", Official Journal no.62/2009, (as amended by Law 10137/2009; Law no. 42/2013);

31. Law No. 10431/2011 "On Environmental Protection";

32. Law 111/2012 "On Integrated Water Resources";

33. Law 81/2017 "On protected areas".

B. LIST OF NATIONAL STRATEGIC AND PROGRAM DOCUMENTS

1. National Environment Strategy 2007- 2013, approved in 2006.
2. Strategy of Agriculture and Food, approved in 2007.
3. Strategy Priorities and National Action Plan for Conservation and Use of Farm Animal Genetic Resources, 2007.
4. National Program on Protection and Management of the Plant Genetic Resources, accompanied by an Action Plan, 2011.
5. National Biodiversity Strategy and an Action Plan for the Period 2015-2020, adopted in January 2016.
6. Document on Strategic Policies on Biodiversity Protection, January 2016.
7. Strategy of Forests and Pastures Development, 2016.
8. National Strategy for Development and Integration (NSDI) 2007-2013, revised and updated as NSDI 2014-2020, approved in 2015.
9. Intersectorial Strategy for Rural and agricultural Development, 2007-2013.
10. Rural Development Program 2014-2020, under Instrument for Pre-Accession Assistance (IPA); 28 May 2015.
11. Country Programming Framework (CPF) for the period 2015-2017.

C. LIST OF INTERNATIONAL AGREEMENTS/CONVENTIONS

1. The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, Rio de Janeiro on 5 June 1992; ratified by Albania in 1996.
2. Nagoya Protocol “On Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity”, Nagoya, Aichi Prefecture, Japan, from 18 to 29 October 2010, ratified by Albania in 2014.
3. International Treaty on Plant Genetic Resources for Food and Agriculture, ratified by Albania in 2010.
4. Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean. Dec 12, 1999, Barcelona, Spain, ratified by Albania in July, 26, 2001.
5. Cartagena Protocol on Bio-safety to the Convention on Biological Diversity. 11 September 2003, Cartagena, Columbia, ratified by Albania in 8 Feb 2005.
6. The Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture, adapted by FAO, November 2011
7. Albania has acceded to the Supplementary Protocol on Liability and Redress of the Cartagena Protocol on Bio-safety by the Law No. 112/2013, dated 22.11.2012.

ANNEX 5

LIST OF REFFERENCES FOR GENETIC RESOURCES IN AGRICULTURE

1. Elezi, F., et al. Genetic variation of oregano (Origanum vulgare L.) for etheric oil in Albania. Agricultural Sciences: 4 (2013) 449-454.

2. FAO. Gender, Agriculture and Rural Development in Albania. Country gender assessment series. 2016.

3. Elezi, F., et al. The Albanian Gene Bank and the program for the conservation of plant genetic resources; 49th Croatian & 9th International Symposium on Agriculture. February 16 – 21, 2014, Dubrovnik, Croatia.

4. Gixhari, B. et al. Diversity of Albanian plant genetic resources inventory assessed by EURISCO passport descriptors. Albanian j. agric. sci. 2013; 12 (4): 741-746.

5. GIZ. Report: Baseline study on the status and use of native plant and animal landraces in the CABRA project area, November 2015.

6. IPGR. National Inventory- December 2016. Tirana, 2017.

7. IPGR. Documentation of Plant Genetic Resources, Tirana, 2017.

8. Ismaili, H, et al. Old Olive Inventory in Adriatic and Ionian Coast of Albania. Int. J. Curr. Microbiol. App. Sci (2016) 5(5): 502-511.

9. Ismaili, H., et al. Morphological characteristics of olive varieties. National Symposium “Olive Genetic Resources” ORS-Tirana, Albania: 14th January 2015.

10. Jani, S. et al. On-farm conservation of some vegetable landraces in Korcha region, December 2015. Jani, S. et al. Exploration and collecting local genetic resources of vegetable crops and pulses (This activity was carried out by implementing the bilateral research project between Albania and FAO (TCP/ALB/3401/Conservation and management of endangered locally adapted crop varieties). Albanian j. agric. sci. 2016; Special edition 15-18.

11. Jani, S. et al. Four indigenous tomatoes with genetic and agro-economic values in Northern Albania, May 2017(Presentation in 2-nd International Conference on “Biotechnology in Agriculture”, April, 18-19, 2017, Tirana, Albania).

12. Jani, S. et al. Landraces in Albanian Alps area: perspectives for on farm conservation and production for quality and local markets, May 2017(Presentation in 2-nd International Conference on “Biotechnology in Agriculture”, April, 18-19, 2017, Tirana, Albania).

13. Jani, S. et al. Progress Report on Conservation and sustainable use of Agro-biodiversity in North Albanian Alps, 2016 (Prepared in the framework of the project: Conservation of Agro-biodiversity in Rural Areas of Albania; Action line: On-farm conservation and sustainable use of

local varieties, Contract no: 83226204; Duration period, from: 2016-02-01 to: 2017-10-30).

14. Jani, S. et al. Studimi i kushteve mjedisore, social-ekonomike dhe statusi i kultivarëve të fermerit, Tirana, 2016. (Prepared in the framework of the project: Conservation of Agro-biodiversity in Rural Areas of Albania; Action line: On-farm conservation and sustainable use of local varieties, Contract no: 83226204; Duration period, from: 2016-02-01 to: 2017-10-30).

15. Pepkolaj, A; et al. DRAFT- Country Report on the State of PGRFA in Albania. Tirana, November, 2015(Prepared by Pepkolaj, A; Faslia, N; and Gixhari, B., in the framework of the project: TCP/ALB/3401- Conservation and management of endangered locally adapted crop varieties, 2013-2015).

16. Tahiri, F. 2007. Capacity building to support *in-situ* conservation and use of animal genetic resources. Report of National consultant. FAO –TCP/ALB/3001(A).

17. Papa, L. 2009. Conservation and Management of local animal rare breeds. VI-th International Symposium–Biodiversity - conservation and sustainable use key factor for rural development. Tirana, 29 September, Proceeding book p. 123-128.

18. Kume, K. Tahiri, F. 2008. Albanian National Action Plan for conservation and Sustainable use of FAnGR. International Symposium Animal Production, Veterinary medicine and Agro economy in the healthy and food safety production. Montenegro, Herceg Novi, June, 22-29,2008.

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20. Kume, A. 2011. Analysis of the Albanian national Legislation in the light of the international legal framework relevant to the conservation and use of Farm Animal Genetic Resources. Procedding book VIIth International Symposium Biodiversity. Tirana, Albania. Proceeding Book, p.38-41.

21. Kume, A. 2011.The legal frameworks and policies relevant to Farm Animal Genetic Resources in AlbaniaJournal of Agriculture and Animal Production Science for Rural Development. Albanian Academy of Science and BLEKALB Foundation. Vol I (2). 2011, p.45-50.

22. Kume, A. 2012. The legal issues on subsidies of endangered animal breeds in Albania and their need for improvement in light of International and EU legislation. Procedding book VIIIth International Symposium Biodiversity. Tirana, Albania. Proceeding Book, p.50-54.

23. Kume, A. 2012. Analyze of Albanian legal framework relevant to animal welfare.Third International Scientific Symposium-„Agrosym 2012“Jahorina, Bosnje-Hezergovina. November 15 - 17, 2012. Book of Proceedings. P. 253-258.

24. Kume, A. 2012. Analysis of the Albanian National legislation in the light of the International legal framework relevant to the conservation and use of Animal Genetic Resources. Biotechnology in Animal Husbandry. Institute for Animal Husbandry, Belgrad- Zemun, Serbia. Vol 28, 4, 2012, p. 879- 890.

25. Kume, K., Papa, L.. 2012. Study of biodiversity in goats in Albania. Proceeding Book. Third International Scienticic Symposium "Agrosym 2012" Jahorina, BiH. pp.492-498.

26. Kume, K. (editor) 2013. "Busha – old cattle of the Balkan" ERFP. ISBN9-789995-637880.

27. Kume, A. 2013 The legal issues on subsidies of endangered animal breeds in Albania and their need for improvement in light of International and EU legislation. Albanian Journal of Agriculture Science. Agricultural University of Tirana. Vol 12(1),2013, p.123-127.

28. Kulici, M., Kume, K. 2014 Local 'differentiation of Albanian bee population based on variability of morphologic traits. Journal of Agriculture and Animal Production Science for Rural Development, Vol IV (1) Year, 2014. p.49-55.

29. Dobi, P. et al. 2014 Building Hasi goat meat value chain - a way to preserve agro biodiversity and improve living in remote areas of northern Albania Proceeding book Xth International Symposium Biodiversity. Tirane, Albania. Proceeding Book, p.124-132.

30. Xhemo, F. et al. 2014 Grazing capacity and herbage mass quality for organic grazing sheep in a mountain pasture of Ostrovica Proceeding book Xth International Symposium Biodiversity. Tirane, Albania. Proceeding Book, p.209-214.

31. Marikaj, K. 2016 "Strategic priorities for conservation biodiversity and forests in Albania" XIIth International Symposium on Biodiversity. Tirane, Albania. Proceeding Book, p.33-42.

32. S. Ceccobelli et al. 2016 Genetic diversity and phylogeographic structure of sixteen Mediterranean chicken breeds assessed with microsatellites and mitochondrial DNA. Livestock Science 175, 27–26.

ANNEX 6

LIST OF REFERENCES FOR CONSERVATION EFFORTS OF GENETIC RESOURCES

The Albanian Genetic Bank currently maintains in *ex-situ* form 3,833 accesses of 133 plant species. 3,219 accesses of those are stored with seed in the standard conditions in base collections and 614 accesses are stored in the field collections, in Valias (Tirana). The collections are composed of cereals and maize (1,434 accesses), vegetables crops and beans (595 accesses), medicinal and aromatic plants (525 accesses), industrial plants (436 accesses), forage crops (199 accesses), and fruit trees (644 accesses).

The genetic bank database is part of the National Inventory database, which includes data for 4,105 accesses to 140 different plant species.

More information can be found at: http://qrgj.org/; http://qrgj.org/databaze/; http://eurisco.ipk-gatersleben.de; http://www.fao.org/wiews/; https://www.genesyspgr.org/.

ANNEX 6a

LIST OF NATIONAL COLLECTIONS - PLANT

National/entity collection		Conservation status						
		No of samples		Completely documented	Characterized	Evaluated	Multiplicated	Duplicates in other GB
CROPS		*ex-situ*	*in-situ*	approximate % of the total crop samples				
CEREALS								
Corn	*Zea mays*	678	18	100	25	25	25	10
Barley	*Hordeum vulgare*	76	0	100				
Buckwheat	*Fagopyrum esculentum*	-	-	-				
Millet	*Panicum miliaceum*	1	0	100				
Oats	*Avena sativa*	18	3	100				
Rice	*Oryza sativa*	102	0	100				
Rye	*Secale cereale*	34	3	10				
Sorghum	*Sorghum bicolor*	-	-	-				
Broomcorn	*Sorghum vulgare*	22	0	20				
Wheat	*Triticum aestivum*	274	1	50	50	50	50	30
Wheat	*Triticum durum*	284	0	50	50	50	50	20
Wheat	*Triticum monococum*	22	0	0				
Wheat	*Triticum turgidum*	4	0	0				
Wheat	*Triticum vulgare*	3	0	0				
Wheat	*Triticum sp*	7	0	0				
Aegilops	*Aegilops sp*	34	34	100				
LEGUMES								
Beans	*Phaseolus vulgaris*	274	5	100	50	50	50	50
Runner bean	*Phaseolus coccineus*	4	0	1				
Adzukibean	*Vigna angularis*	1	0	100				
Broad bean	*Vicia faba*	48	0	0-				
Chickpea	*Cicer arietinum*	7	0	100				
Cowpea	*Vigna unguiculata*	1	0	100				
Lentil	*Lens culinaris*	4	0	100				
Peas	*Pisum sativum*	31	0	100				40
Soybean	*Glycine max*	29	0	0				
FODDER CROPS								
Alfalfa	*Medicago nigra*	1	1	100				
Alfalfa	*Medicago polymorpha*	3	3	100				
Alfalfa	*Medicago sativa*	36	36	50				60
Clover	*Trifolium sp.*	19	19	0				
Common sunfoin	*Onobrychis sativa*	-	-	-				
Common yarrow	*Achillea millefolium*	4	4	100				
Ervil	*Vicia ervilia*	6	0	0				

Fescue	*Festuca arundinacea*	2	0	0				
Fescue	*Festuca pratensis*	2	0	0				
Fodder beet	*Beta vulgaris ssp. Vulgaris*	1	0	0				
Grass	*Dactylis glomerata*	1	0	0				
Grass pea	*Lathyrus sativus*	21	0	0				
Lupine	*Lupinus spp*	-	-	-				
Meadow grass	*Poa annua L*	-	-	-				
Rye grass	*Lolium perenne*	10	0	0				
Safflower	*Carthamustinctorius*	-	-	-				
Sainfoin	*Onobrychis viciifolia*	-	-	-				
Timothy	*Phleum pratense*	7	7	0				
Trefoil	*Lotus sp.*	2	0	0				
Vetch	*Vicia sativa*	10	0	10				
Vetchling	*Lathyrus cicera*	-	-	-				
Yellow sweet cover	*Melilotus albus*	2	2	0				
Yellow sweet cover	*Melilotus officinalis*	2	2	0				
INDUSTRIAL CROPS								
Anise	*Pimpinella anisum*	1	0	0				
Castor bean	*Ricinus communis*	-	-	-				
Cotton	*Gossypium herbaceum*	3	0	0				
Cotton	*Gossypium hirsutum*	22	0	0				
Flax	*Linum usitatissimum*	1	0	0				
Hemp	*Cannabis sativa*	1	0	0				
Hop	*Humulus lupulus*	-	-	-				
Peanuts	*Arachis hypogaea*	-	-	-				
Poppy	*Papaver somniferum*	-	-	-				
Rapeseed	*Brassica napus*	1	0	0				
Sesame	*Sesamum indicum*	-	-	-				
Sugarbeet	*Beta vulgaris*	25	0	0				
Sunflower	*Helianthus annuus*	22	0	0				
Tobacco	*Nicotiana tabacum*	206	0	100	50	50	50	
Tobacco	*Nicotiana acuminata*	1	0	100				
Tobacco	*Nicotiana rustica*	1	0	100				
Tobacco	*Nicotiana alata*	1	0	100				
VEGETABLE CROPS								
Asparagus	*Asparagus officinalis*	-	-	-				
Broccoli	*B. oleraceavar. Botrytis*	-	-	-				
Brusselss prouts	*B. oleraceavar. Gemmifera*	-	-	-				
Cabbage	*Brassica sp.*	7	0	100				
Calabash, Gourd	*Lagenaria siceraria*	-	-	-				
Carrot	*Daucus carota*	2	0	0				
Carrot(wild)	*Daucus carota*	10	10	100			100	
Celery	*Apium graveolens*	1	1	100			100	
Celery	*Apium graveolens. Dulce*	-	-	-				
Chard	*Beta vulgaris var. vulgaris*	1	0	0				
Chicory	*Cichorium intybus*	3	1	100	100	100	100	
Coriander	*Coriandum sativim*	3	2	100				
Cress	*Lepidium sativum*	1	0	0				

Cucumber	*Cucumis sativus*	25	0	100				20
Dill	*Anethum graveolens*	2	0	100				10
Eggplant	*Solanum melongena*	9	0	100			100	30
Endive	*Cichorium endivia*	1	0	100	100	100	100	
Fennel	*Foeniculum vulgare*	1	0	100				
Fennel(wild)	*Foeniculum vulgare*	4	0	100				
Garlic	*Allium sativum*	1	0	0				
Goosefoot	*Chenopodium album*	4	0	0				
Kale	*B. oleracea var. acephala*	-	-	-				
Kohlrabi	*B. oleracea var. gongylodes*	-	-	-				
Leek	*Allium ampeloprasum*	3	0	0				
Lettuce	*Lactuca sativa*	8	0	100	100	100	100	50
Melon	*Cucumis melo*	50	4	0				
Mustard	*Sinapis sp.*	1	1	0				
Mustard	*Sinapis alba*	-	-	-				
Okra	*Abelmoschus esculentus*	4	4	50				50
Onion	*Allium cepa*	8	8	0				
Orache	*Atriplex hortense*	-	-	-				
Parsley	*Petroselinum crispum*	4	0	0				
Parsnip	*Pastinaca sativa*	-	-	-				
Pastinaca	*Pastinaca sativa*	-	-	-				
Patience-dock	*Rumex patentia*	-	-	-				
Pepper	*Capsicum annuum*	58	12	100	100	100	100	10
Peppermint	*Mentha piperita*	4	4	0				
Primrose	*Primula veris*	1	1	0				
Potato	*Solanum tuberosum*	-	-	-				
Pumpkin	*Cucurbit asp.*	6	6	100				30
Radish	*Raphanus sativusvar. Radicula*	-	-	-				
Red beet	*Beta vulgaris*	1	0	-				
Rocket salad	*Eruca sativa L*	3	3	100	100	100	100	
Sorrel	*Rumex acetosella*	1	1	100				
Spinach	*Spinacia oleracea*	-	-	-				
Tomato	*Licopersicon esculentum*	88	5	100	50	50	50	10
Turnip	*Brassica rapa*	-	-	-				
Watermelon	*Citrullus lanatus*	-	-	-				
Wild chervil	*Anthricus sylvestris*	2	2	100				
Zuccini	*Cucurbita pepo*	2	0	100				
FRUIT CROPS								
Almond	*Prunus dulcis*	8	8	0				
Almond(wild)	*Prunus vebbii*	1	1	0				
Apple	*Malus pumila*	77	77	70	70	70	70	
Apple	*Malus sylvestris*	2	2	0				
Apple(wild)	*Malus sylvestris*	2	2	0				
Apricot	*Prunus armeniaca*	10	10	100	100	100	100	
Blackberries	*Rubus spp.*	-	-	-				
Blackthorn	*Prunus spinosa*	2	2	0				
Blueberry	*Vaccinium spp*	18	18	100				
Common ash	*Fraxinus excelsior*	1	1	0				

Cornelian cherry	*Cornus mas*	3	3	0				
Cherry(sweet)	*Prunus avium*	52	52	50	50	50	50	
Cherry	*Prunus cerasus*	1	1	100	100	100	100	
Chestnut	*Castanea sativa*	-	-	-				
Currants	*Ribe ssp.*	-	-	-				
Elder	*Sambucus nigra*	1	1	-				
Fig	*Ficus carica*	12	12	100	100	100	100	
Grapevine	*Vitis vinifera*	160	160	50	50	50	50	
Grapevine(wild)	*Vitis sylvestris*	2	2	0				
Hazelnut	*Corylus avellana*	5	5	0				
Juniper	*Juniperus communis*	5	5	0				
Mahaleb cerry	*Prunus mahaleb*	2	2	0				
Mulberry	*Morus spp*	4	4	0				
Olive	*Oleae uropaea*	33	33	100	100	100	100	
Olive(wild)	*Oleae uropaea*	1	1	100	100	100	100	
Peach	*Prunus persica*	16	16	100	100	100	100	
Pear	*Pyrus communis*	98	98	50	50	50	50	
Pear(Almond leaved)	*Pyrus amygdaliformis*	2	2	0				
Persimmom	*Dyospyros sp.*	-	-	-				
Pistachionut	*Pistacia vera*	-	-	-				
Plum	*Prunus domestica*	71	71	50	50	50	50	
Plum(Myrabolana)	*Prunus cerasifera*	4	4	100				
Plum	*Prunus cerasus*	34	34	50	50	50	50	
Pomegranate	*Punica granatum*	17	17	0				
Quince	*Cydonia oblonga*	13	13	0				
Raspberry	*Rubus spp*	1	1	0				
Sour Cherry	*Prunus cerasus*	1	1	0				
Strawberry	*Fragaria x ananassa*	-	-	-				
Terebinth	*Pistacia terebinthus*	1	1	0				
Walnut	*Juglans regia*	4	4	0				
MEDICINAL AND AROMATIC PLANTS								
Alexander	*Smyrnium olusatrum*	1	1	0				
Basil	*Ocimum basilicum*	8	0	0				
Bishop weed	*Ammi visnaga*	1	1	0				
Chamomile	*Matricaria recutita*	10	10	100	100	100	100	
Felty germander	*Teucrium polium*	1	1	0				
Great yellow gentian	*Gentiana lutea*	2	2	0				
Hemlock	*Conium maculatum*	2	2	0				
Howthorn	*Crataegus monogyna*	1	1	0				
Lemon balm	*Melissa officinalis*	2	2	0				
Macromeria	*Micromeria sp.*	1	1	0				
Mountain tea	*Sidiritis montana*	2	2	100	100	100	100	
Oenanthe	*Oenanthe pimpinelloides*	2	2	0				
Origano	*Origanum vulgare*	124	124	100	50	50	50	30
Origano greek	*Origan.vulgare sub. hirtum*	4	4	100				
Perforate	*Hypericum perforatum*	1	1	0				
Sage	*Salvia officinalis*	157	157	100	50	50	50	
Savory	*Satureja montana*	115	115	100	50	50	50	
Thyme	*Thymus vulgaris*	50	50	50				

ANNEX 6b

LIST OF NATIONAL COLLECTIONS - ANIMAL

Current status of breed diversity, number of breeds for which characterization has been carried out and their status in conservation programs

	Current Total		At Risk		Widely used		Lost (last 20 years)		At population level			At individual level		
									Baseline survey	Genetic distance	Protection status	Performance recording	Genetic evaluation	Molecular evaluation
	L	I	L	I	L	I	L	I						
Cattle	5	4	5	0	N/A	N/A	1	N/A	5	4	3			2
Water Buffalo	1	N/A	1	N/A	N/A	N/A	N/A	N/A			1			1
Sheep	6	3	2	0	0	0	0	0	5	5	2			5
Goats	10	2	3	0	0	0	0	0	3	6	3			6
Horses	3	N/A		N/A	1	0	N/A	N/A						
Donkeys	2	N/A		N/A	0	0	N/A	N/A						
Pigs	3	1	3	N/A	0	N/A	0	N/A			3			
Chicken	6	N/A	1	N/A	N/A	N/A	N/A	N/A						
Turkey	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Ducks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Geese	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Honey bees	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						

- L = Locally Adapted or Native; I = Introduced/Imported (Recently Introduced and Continually Imported).
- Breeds at risk use FAO classification (http://www.fao.org/docrep/010/a1250e/a1250e00.htm).
- Consider breed characterization during the last ten years.
- Baseline survey summary data describing the identification and observable characteristics, location, uses and general husbandry of the AnGR for each species used in the country for food and agricultural production.
- Genetic distances among breeds computed from molecular analyses.
- Protection status: *In-situ* (includes all measures to maintain live animal breeding populations, including those involved in active breeding strategies in the agro-ecosystem where they either developed or are now normally found, together with husbandry activities that are undertaken to ensure the continued contribution of these resources to sustainable food and agricultural production, now and in the future); *Ex-situ* conservation (genetic material within living animals but out of the environment in which it developed – *Ex-situ* in vivo, or external to the living animal in an artificial environment, usually under cryogenic conditions including, the cryo-conservation of semen, oocytes, embryos, cells or tissues - *Ex-situ* in vitro.
- Performance recording is based on individual animal data for milk yield, growth, reproduction, etc.
- Genetic evaluation refers to estimation of breeding values.
- Molecular evaluation includes information of markers, DNA, blood type, protein alleles, etc.

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