GARDENS of BIODIVERSITY

Conservation of genetic resources and their use in traditional food production systems by small farmers of the Southern Caucasus
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Photographs by Marzio Marzot
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With admiration, this book is dedicated to the people of the Southern Caucasus, and to the wealth of genetic resources resulting from their inspiration and work over the centuries. In managing their natural resources, these people have made an outstanding contribution to maintaining biodiversity and, as a consequence, to global food security.

The Southern Caucasus region was paramount in the evolution and differentiation of various domesticated plant and animal species; moreover, the region saw the beginnings of farmers’ and pastoralists’ settlements in the early stages of agriculture. Throughout the ages, the region was home to many populations who learned how to make a living out of a rugged land, by developing skills and locally adapting techniques – such as selecting a wide range of crop varieties, livestock breeds and integrated crop-livestock systems – to adapt to cold winters, dry summers, pests, diseases and the introduction of alien species.

The valued genetic resources and variety of agricultural practices (from production to preservation) in family gardens support year-round household food security. Together, these ensure yields over the longer term, and contribute to sustainable agricultural production intensification, farmers’ livelihoods, healthy and diversified diets, healthy ecosystems and sociocultural stability.

Yet this sustainability, achieved through agricultural practices based on the conservation and sustainable use of local genetic resources in the Southern Caucasus, is at risk of being lost. Over the last few decades, changing biophysical and socio-economic pressures have increased risks from poor management of natural resources, loss of biodiversity, soil and water pollution and degradation, and vulnerability to climate change.

This book describes selected genetic resources and traditional management practices maintained by farmers and pastoralists in the gardens and landscapes of the Southern Caucasus, showing that understanding and building on local traditions can help these to be

Foreword

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valued, and also help to capitalize on what they have to offer. A close, detailed study of local agro-ecological and social conditions can contribute to identifying solutions for global problems; in short, it is possible to build on the knowledge and selection of the best genetic resources and local practices combined with efficient technologies and science to transform and increase options for agriculture in the Southern Caucasus towards sustainable development.

The genetic material treasured in the Southern Caucasus is essential for the achievement of Millennium Development Goals 1 and 7 in the region and for the entire world; collective efforts need to be made to preserve and use it.

Special thanks must be given to the many Armenian, Azeri and Georgian contributors to the book. The material they have collected, as well as that collected by the authors, was so extensive and rich that the editors have had the uneasy task of making a rigid selection — as diversified and as balanced as possible — of the many examples of plant and animal genetic resources that farmers and pastoralists have maintained, and of their traditional management practices. Additional and more detailed information on each subject can be found in the bibliography at the end of each chapter and at the following link: www.fao.org/agriculture/gardens_of_biodiversity

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FOREWORD
There are still over a billion hungry people in the world today, and the resources with which to feed these people are becoming scarcer. Agricultural production systems need to focus more on the effective management of biodiversity and ecosystem services in order to conserve biodiversity and safeguard the environment, while feeding the global population. This is especially true in light of global challenges such as ensuring food security, climate change, shifts in population distribution and consumer preferences for food as well as potentially rising energy prices. Well-managed ecosystems are essential for ensuring a healthy resource base on which to intensify sustainably, to ensure that enough food is produced from now until 2050 – and beyond.

Biodiversity and its sustainable use and management are fundamental not only for providing food, but for maintaining and enhancing well-managed agro-ecosystems which in turn are necessary for healthy food production.

The role of biodiversity and the genetic resources it carries is essential for ensuring food security, sustainable livelihoods, ecosystem resilience, coping strategies for climate change, adequate nutritional requirements, insurance for the future (for example, for crop and animal breeding) and the management of biological processes needed for sustainable agricultural production.

With farming practices shifting away from heavy dependency on non-renewable inputs and chemical-based intensification (such as monocultures or the overuse of pesticides and fertilizers), the management of biological processes (such as pest regulation and control, soil biological processes and pollination) is increasingly becoming a recognized option for sustainable agricultural production intensification.

Agricultural systems are by far the largest managed ecosystems in the world. This gives farmers an ever-increasing role in maintaining and enhancing agricultural biodiversity and in providing the wider community with a range of ecosystem services. Farmers are the largest group of natural resource managers on the Earth. They both depend on and generate a wide array of biodiversity and ecosystem services. Their actions can enhance or degrade ecosystems. Farmers’ knowledge is therefore very important in understanding what drives their decisions in all aspects of agricultural production, the sustainable use of biodiversity, the role of the biological process in sustainable agricultural production intensification, and the enhancement of ecosystem functions.

Globally, conserving genetic diversity both in situ and ex situ, and managing biodiversity in situ, are important, in order to capitalize on those traits that are adapted to specific conditions.
The biodiversity maintained in the Southern Caucasus is important for national food security, but also for the wider globe (for example, traits that are found in locally adapted species in the Caucasus can be adapted to suit similar climatic conditions in other geographic areas). The genetic resources found in the Southern Caucasus also play an important role in local culture, traditions and society. Despite the fact that many farmers, scientists, policy-makers and non-governmental organizations (NGOs) in the Southern Caucasus are struggling to preserve these genetic resources, their work is not sufficiently known and they are insufficiently connected with the many farmers, scientists and policy-makers of other countries who could share the benefits deriving from using these genetic resources for their agriculture.

One of the greatest challenges to achieving food security is recognizing – and internalizing into concrete action – the longer-term perspective of environmental sustainability. This is important for farmers, but also critical for policy-makers (at all levels – national, regional and international), to make informed decisions that have a positive impact on farmers’ livelihoods, the health of the population, the health of the environment and, ultimately, food security.

Effective policy should provide an enabling environment for different sectors to have a favourable impact on sustainable agricultural production intensification, and therefore also on farmers. Hence, the management of natural resources, including biological processes, biodiversity and the ecosystem services it provides, becomes essential not only at the farm level, but also at the policy level.

In a world of global changes, a collective effort is necessary to recognize the geographic interdependence between countries and regions.

There is a need to expand beyond national boundaries and promote international collaboration, develop joint research and breeding programmes, promote exchange and develop and strengthen collaboration programmes. This is particularly salient when facing the need to intensify agricultural production sustainably through applying ecosystem approaches.

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ABOUT THIS BOOK

This book describes how farmers and rural people in the Southern Caucasus maintain biodiversity and apply the ecosystem approach in their daily lives and agricultural practices. These practices contribute to their food security and livelihoods while also maintaining local genetic resources.

This book does not claim to offer a definitive prescription for sustainable agriculture and is not an exhaustive study. It puts forth a collection of concrete examples showing how genetic resources are maintained and used by small farmers for food security in the Southern Caucasus. These examples show that the livelihoods and prospects of rural people can be improved and consolidated in a sustainable manner to face important environmental, social and economic challenges without sacrificing the prosperity of future generations. The book would like to stimulate further debate, research and policies in the hope that bridges can be built between the sustainable use of biodiversity and genetic resources, traditional practices and ways of life, and the new technologies, demands and challenges of today's society.

THE BOOK IS DIVIDED INTO NINE CHAPTERS THAT FOLLOW A SHORT STORY IN THE FORM OF A VERSE.
AT THE CROSSROADS BETWEEN EAST AND WEST

The Caucasus is a geographic hinge that connects Europe and Asia. It is characterized by the imposing mountain ranges that give their name to the region. This book focuses on the southern slopes of the Caucasus range and the nearby areas located between the Black and the Caspian Seas. The high mountains (over 5,000 m) provide protection from the excesses of the northern continental climate, but the variety of lands and soils (mountains, plains, lowlands and seashores) creates a unique combination of different climates, ranging from dry to humid and from subtropical to alpine. Due to these features, the Southern Caucasus has been identified as one of the centres of origin of many plant species, such as soft wheat, and a centre of genetic differentiation. Like other areas in the world, the Southern Caucasus is experiencing the negative effects of weak past policies and ecosystem management, pollution, overexploitation and, more recently, climate change. But the Southern Caucasus is also a land of hope: throughout its varied territories, people and institutions are willing to restore and maintain their resources and biodiversity.

IN THREE HOSPITABLE COUNTRIES

The territory of the Southern Caucasus is shared by three countries: Armenia, Azerbaijan and Georgia (throughout the book the names of the three countries are generally listed in alphabetical order). Their identities are closely linked with the characteristics of the region: they are different yet similar. They share common features but have their individual properties; all three are rich in history, culture and natural resources. Armenia is in the centre of the region, and is the smallest of the three countries. It is landlocked but hosts the largest freshwater reservoir of the region (Lake Sevan). Azerbaijan lies to the east and south and faces the Caspian Sea. It is the largest country of the three. Georgia lies to the northwest, facing the Black Sea. It has the highest peak in the Southern Caucasus (Mount Shkhara, 5,201 m). Population density is comparable for the three countries (80–100 inhabitants/km²).

AGRICULTURE AND BREEDING HAVE BEEN DEVELOPED SINCE THE NEOLITHIC

Besides being one of the centres of origin and of differentiation of plant species, the Southern Caucasus is also an area in which agriculture and breeding were first developed, about 10,000 to 5,000 years ago, in the Neolithic. There is significant evidence of such an early presence of farmers and cattle breeders throughout the region. The cultivated species found include several varieties of wheat, apples, apricots, pears, grapes, peas and beans. Agriculture and breeding flourished over the centuries, but many local varieties are currently at risk of extinction. It is important to maintain the genetic resources and integrate state-of-the-art information and technologies with traditional practices that proved to be so efficient in the past.

COPING WITH THE RHYTHMS OF THE SEASONS

The Southern Caucasus stretches from west to east along a narrow range of latitudes, between 38° and 43° north. As a result, its many different climatic patterns, determined by the variety of chorography, influence of seas, etc., share the common rhythm of the four yearly seasons. Over the centuries, plants and animals have adapted to this rhythm and to the different climates, and people have had to adapt their farming practices to cope with these changes for a sustainable living. For example, in colder climates, specific varieties have been selected, such as the winter apple, and many methods of preserving food (such as jams, syrups, dry meat and dry bread – the lavash) have been developed in order to withstand the long winters. The rich biodiversity of the Southern Caucasus, concentrated in such a small territory, could become a natural laboratory for the maintenance and diffusion of precious genetic material and to face climate changes.

A TREASURY OF GENETIC RESOURCES IS MAINTAINED IN GARDENS

Historically, the family garden represents the basis of agricultural production in the region. The rugged territory and the presence of a significant rural population have presented perfect conditions for the diffusion of an agricultural system based on these gardens. Yet the garden is even more: it is the symbol of a lifestyle, of the deep knowledge of a territory and its resources, a continuous search for balance between exploitation and maintenance of the resources,
social and economic development in order to correct past policy and market failures. However, the central focus must remain on pastoralists and farmers. Their understanding of the landscapes in which they live and operate must be the starting-point for the application of modern technologies and policies.

RURAL PEOPLE KNOW AND USE WILD PLANTS AND ANIMALS

The system based on garden production is not a closed one. Cultivation and breeding are often integrated with collecting wild species and hunting. This contributes to nutritional diversity in diets and helps people overcome times of hardship such as economic, food and energy crises. Grasslands play an important role in this scenario, as they provide the right environmental conditions for the development of wild flora and fauna and represent the bridge between agriculture, animal production and nature conservation, protection and sustainable management. The Southern Caucasus is rich in grasslands, but today too many are degraded because of overexploitation and pollution. Rural populations wisely use natural resources: they just need to be supported by adequate policies.

COMBINING BIODIVERSITY, HEALTHY ECOSYSTEMS AND SMALLHOLDERS’ DEDICATION: A PATHWAY INTO THE FUTURE

The ecosystem approach is the framework for action under the Convention on Biological Diversity (CBD). It identifies 12 principles that represent the guidelines for the conservation and sustainable use of natural resources. Each principle is summarized in this chapter and connections are made to subjects developed in this book. The role of biodiversity and its genetic resources is essential for ensuring food sovereignty and food security; sustainable livelihoods; ecosystem resilience; coping strategies for climate change; and sustainable agricultural production. The Food and Agriculture Organization of the United Nations (FAO) provides a platform for dialogue and negotiation through its Commission on Genetic Resources for Food and Agriculture, to reach global consensus on policies relevant to biodiversity for food and agriculture and hosts the Secretariat for the International Treaty on Plant Genetic Resources for Food and Agriculture. FAO is assisting countries in strengthening their policies on the matter as well as in providing technical capacity to address the dual needs of food security and environmental sustainability through the ecosystem approach.