



# Effective genetic resources conservation and use

A Bioversity International initiative

## The challenge

More than 2 billion people depend on smallholder farms and about 1.4 billion people depend on forests for their livelihoods. Without the biological diversity of crops and trees, rural families struggle to adapt to changing climates and markets, and cannot meet their nutrition and livelihood needs.

Rural communities manage and maintain these resources for immediate use. By doing so, they also adapt and improve them for the benefit of broader society and future generations.

## Our research solutions

Loss of crop and tree biodiversity is happening at an unprecedented rate. Climate change is going to exacerbate this loss – in Europe alone, 27-42% of crop wild relatives are predicted to be lost by 2080.

Once these genetic resources are gone, they are gone forever, and with them the options they provide.

This Bioversity International Initiative studies how to curb the loss of crop and tree biodiversity, and support systems that contribute to more diversity through:

### **Strategies, management and trait identification**

This area of work encompasses the design of global and national strategies for the conservation of priority crop genetic resources, and the preparation of action plans to implement these strategies.

While many crops can be stored in seedbanks, crops such as bananas are trickier because they do not produce seeds. We research how to conserve these through cryopreservation and other high-tech solutions.

The seeds of tropical forest trees also die if dried or frozen. For these species, our research explores how to manage forests so that tree populations stay viable.

On farm, we work to understand how and why rural communities continue to manage certain species and varieties and how to provide them with the incentives and capacity to continue to do so.

### **Information services and seed supplies**

In many parts of the world, farmers cannot easily access quality seeds. Bioversity International gathers evidence with farmers, public and private breeders, seed producers, extension agents and natural resource managers about how seed systems function, and how to ensure they deliver varieties and species with the traits farmers need.

We also generate information about the genetic makeup of plants and the traits they possess to suit different nutritional needs, cultural preferences, and difficult environments like saline soils.

### **Policies, institutions and monitoring**

By influencing management decisions at various scales, policies can affect the sustainable use and conservation of crop and tree diversity. Policies also influence how farmers and society can benefit from the use of this diversity.

Working with our partners, we research how policies affect the sharing and conservation of crop and tree diversity. We identify options that mitigate the negative effects of existing policies, and identify incentives for farmers and natural resource managers to conserve, share and use genetic resources.

We also contribute to global efforts to monitor the conservation status of particular species and systems around the world.

## Promoting fruit tree diversity in Central Asia

Yielding fruit and nuts even on poor land, perennial trees such as apple, apricot, almond, pistachio and walnut, are a fundamental part of Central Asia's agriculture.

Bioversity International is promoting the conservation of biodiversity in fruit trees in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Since 2006, Bioversity International has been helping to conserve the wild relatives of native fruit crop species, improve farmers' access to germplasm, land and water resources, and explore ways in which farmers who conserve these resources can share the benefits derived from their use.

### Results

From 2006 to 2011, the project trained around 1,500 farmers in soil, water and crop management practices. All of this has led to better produce, market linkages and the establishment of farmer associations that have improved local incomes and livelihoods.

Over 50 fruit tree nurseries have been established to date, producing more than 1.5 million seedlings annually of traditional varieties of apple, grape, pomegranate and other fruit and nut trees.



## Durum wheat seed systems in Ethiopia

Through our 'Seeds for Needs' initiative, we have been working in Ethiopia since 2009 to bring farmers high-quality and diverse seeds that meet their needs. The farmers we work with are directly involved in evaluating and selecting varieties of barley and durum wheat (most of which are traditional landraces conserved in Ethiopia's national genebank), providing valuable feedback on their preferred traits to scientists. Combining scientific data with the experiences and knowledge of farmers, is a key element of this initiative.

### Results

Our research found that more than 20% of the traditional Ethiopian durum wheat landraces performed better than commercial varieties bred specifically for drought resistance. One variety yielded 61% better than the best commercial variety – an important discovery for food security in the country.

Thanks to our work with partners – such as the Ethiopian Biodiversity Institute and Mekelle University – from 2010 to 2013 varietal diversity increased by 23% across the initiative's sites and more than half are still sharing these varieties within their seed networks. As a result, we now work with over 1,500 farmers in the country who are planting better material in their farms, an achievement that would have taken far longer through a formal plant breeding programme. In 2014, we set up a community seedbank in Amhara region with the Ethiopian Biodiversity Institute, to provide a reliable source of good-quality seeds to farmers in the area.

Bioversity International uses the 'Seeds for Needs' approach in 11 countries on different crops – rice, beans, sorghum, cowpea and many more – and now involves around 25,000 farmers.

## Amending national policy in Nepal

Bioversity International's 'Genetic Resources Policy Initiative' is helping to strengthen the capacity of national partners in eight countries – Bhutan, Burkina Faso, Costa Rica, Côte d'Ivoire, Guatemala, Nepal, Rwanda and Uganda – to combine climate data, geographic information and data on crop suitability, to identify potentially adapted genetic resources from genebank collections around the world.

These activities provide a pretext for the same countries to explore institutional mechanisms to participate in the multilateral system of access and benefit sharing under the International Treaty on Plant Genetic Resources for Food and Agriculture.

Through the multilateral system, the 130 member states of the Treaty have pledged to pool and share the genetic diversity of a range of crops and forages for the purposes of conservation, plant breeding and training.

### Results

In 2013, our Nepalese partners started to create the legal space for the multilateral system, by submitting proposals to amend the National Agrobiodiversity Policy and the National Biodiversity Strategy and Action Plan.



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