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**SECTORAL
CAPACITIES NEED
STRENGTHENING TO
DELIVER TREE SEED FOR
FOREST AND LANDSCAPE
RESTORATION**



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Cover photograph: planting material of *Parkia biglobosa*_neré_at National Tree Seed Center of Burkina Faso @Ewa Hermanowicz

Sectoral capacities need strengthening to deliver tree seed for forest and landscape restoration

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Key priorities

- Increasing investment in national seed systems to increase production of diverse native tree species planting material
- Establishing and enhancing national seed zone maps
- Registering seed sources and digitizing seed source supply chains
- Conserving high-quality seed sources of native tree species
- Improving documentation and verification of seed collection (digitization)
- Increasing budgets for provision of planting material in restoration projects
- Providing more training and capacity development for local stakeholders to support them to engage in seed systems
- Supporting business development, especially for women and youth, around sustainable value chains for native tree genetic resources

Maasai women working on a tree nursery of a traditional women's group

Kisiria Forest, Kenya



Context

The quality and origin of tree seeds and seedlings affect the survival, growth, productivity, ecosystem services and adaptive capacity of restored forests and landscapes. The availability of seeds and seedlings directly influences the delivery of benefits to land users from restoration efforts. Yet, despite more than a decade of global restoration commitments and programmes since 2011, substantial gaps remain worldwide in individual, organizational and sectoral capacities to source and deliver quality tree seeds and seedlings for restoration, especially of native species. Data from global surveys indicate that these gaps affect many, if not most, ongoing projects and result in delays in implementation, cost increases and suboptimal restoration outcomes.

In restoration programmes and projects, the procurement of seeds and seedlings is often viewed as a simple, technical task only and is therefore not a priority in project planning. However, the required material of the selected species is often not readily available when needed during project implementation. This is especially true when working with tropical and subtropical tree species, many of which are severely affected by habitat loss and degradation and for which there is a lack of alternative, purposely established and managed seed sources. Many of these species also have unique biological characteristics that can markedly reduce the availability of seeds and seedlings, such as not fruiting every year or having recalcitrant seeds that germinate immediately and cannot be stored. Restoration can significantly contribute to the conservation of native tree species, but only if the restored populations are sufficiently genetically diverse to enable population persistence.

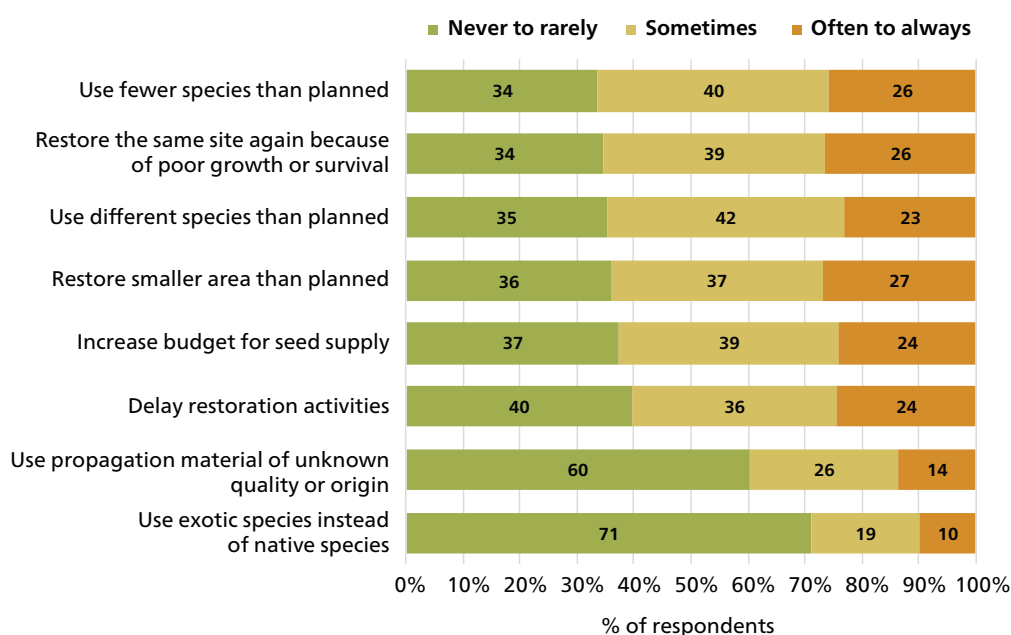
Collecting and producing seeds and seedlings can provide important job and income opportunities for women and men in rural communities, given that achieving local to global restoration targets requires billions of seeds and seedlings under the United Nations Decade on Ecosystem Restoration. However, supply chains for native tree seed are widely lacking, and many projects simply collect their own material or set up temporary nurseries with local stakeholders. This hampers the opportunities for local actors to link with customers and develop a viable local seed and seedling sector beyond time-bound projects.

This policy brief presents recommendations for strengthening capacities for selecting and delivering high-quality, resilient tree seeds and seedlings for restoration. The recommendations are based on a global survey of seed and seedling quality, supply chains and the enabling environment for implementing restoration. It was conducted in September and October 2022, and responses were obtained from 196 practitioners, seed suppliers and experts in 69 countries.

Most surveyed projects suffer from delays and cost increases due to lack of seeds and seedlings

Most projects face problems with seed availability or quality at least sometimes, to the extent that this affects species choice, timelines, budgets and the achievement of restoration targets (Figure 1). A quarter of projects often or consistently ended up using fewer or different species than originally planned. Sixty-six percent of projects had to sometimes restore the same area again because of poor growth or survival due to lack of quality seeds and seedlings.

Figure 1. Strategies that restoration practitioners report using, to overcome problems with tree seed availability and quality



Recommendations for project implementers

- Plan the sourcing of seeds and seedlings during project design to avoid delays and cost increases in implementation. Almost all seeds and seedlings of native tree species come from natural forests or remnant trees on farms and landscapes, and they can be hard to find because of decades of forest loss and degradation in the landscapes that are now prioritized for restoration.
- Follow rules of thumb for sourcing quality seeds and seedlings, using material from:
 - › similar environments to the restoration site (currently and in the future);
 - › large, viable populations (≥ 50 reproductive trees);
 - › many widely spaced trees in seed source populations (≥ 30 trees); and documented sources where the geographical origin and number of mother trees in the seedlot are known.

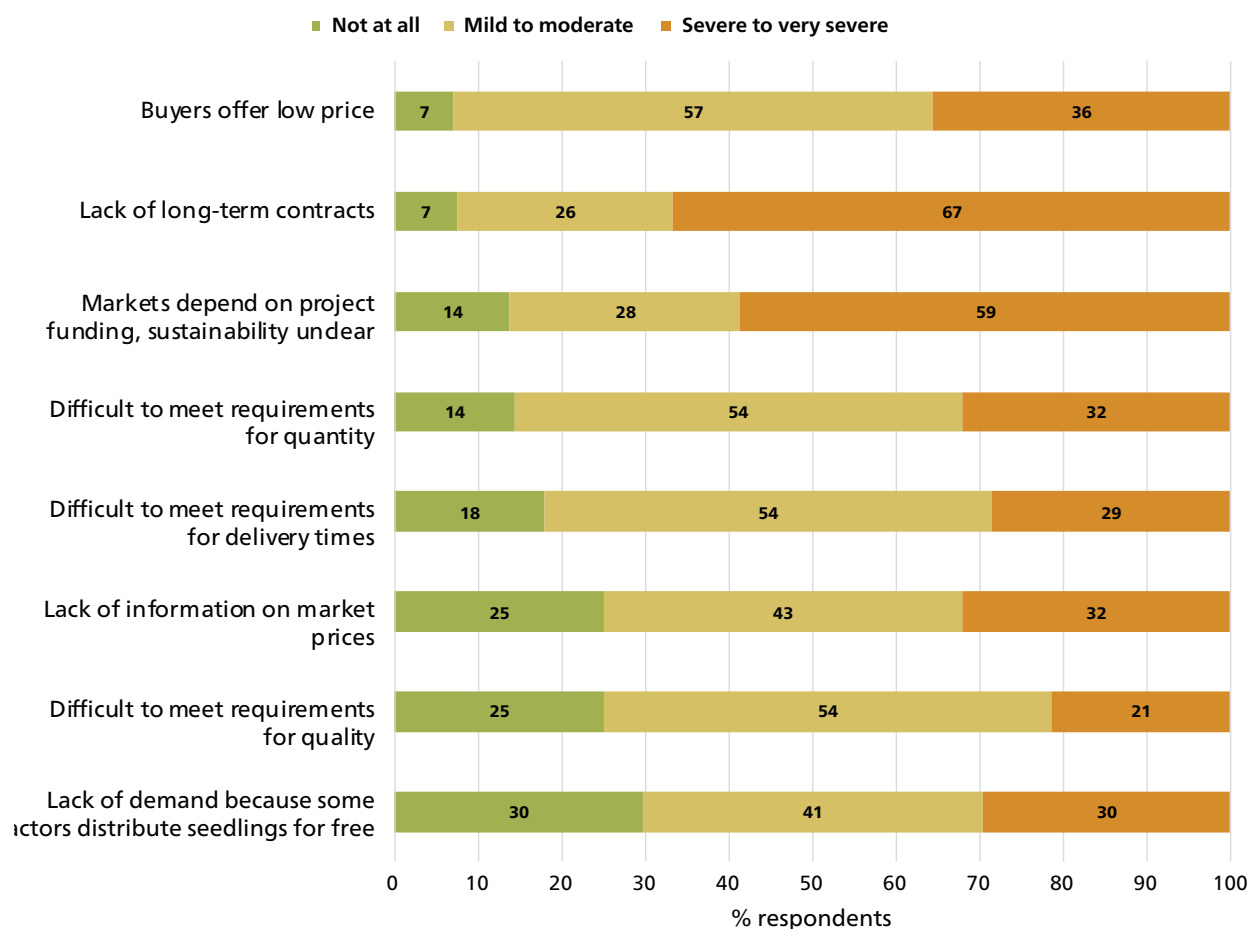
Currently, few projects follow these guidelines. Only 26 percent of surveyed practitioners reported avoiding small seed sources, which typically yield inbred, poor-quality seed, and only 24 percent reported collecting seed from at least 30 trees per species in order to capture high levels of genetic diversity, which increases the adaptive capacity of restored forests.



Shea tree (*Vitellaria paradoxa*)
National Tree Seed Center of Burkina Faso

- When working with suppliers, ensure that they are aware of the need for and committed to providing quality material collected using good practices that capture high levels of genetic diversity. Be prepared to pay extra for quality material of documented origin – the results will pay back as better germination and survival, faster growth and quicker site recovery, and better productivity, ecosystem service provision and resilience in a changing environment.
- Use project funding to strengthen, rather than to compete with, existing suppliers. If suppliers lack capacities to provide quality planting material, provide training to help develop supply chains for quality native tree seed where origin and quality are documented. Sixty percent of surveyed projects set up their own nurseries, and reasons for establishing their own nurseries – for example lack of desired species or concerns about quality – were often such that they could potentially have been resolved with capacity building for existing local suppliers. In addition, only 22 percent of projects reported providing training on business skills and marketing to the nurseries that they established or supported, although dependence of individual projects as customers is a major problem for suppliers (Figure 2).

Figure 2. Problems reported by survey respondents in selling tree seeds and seedlings

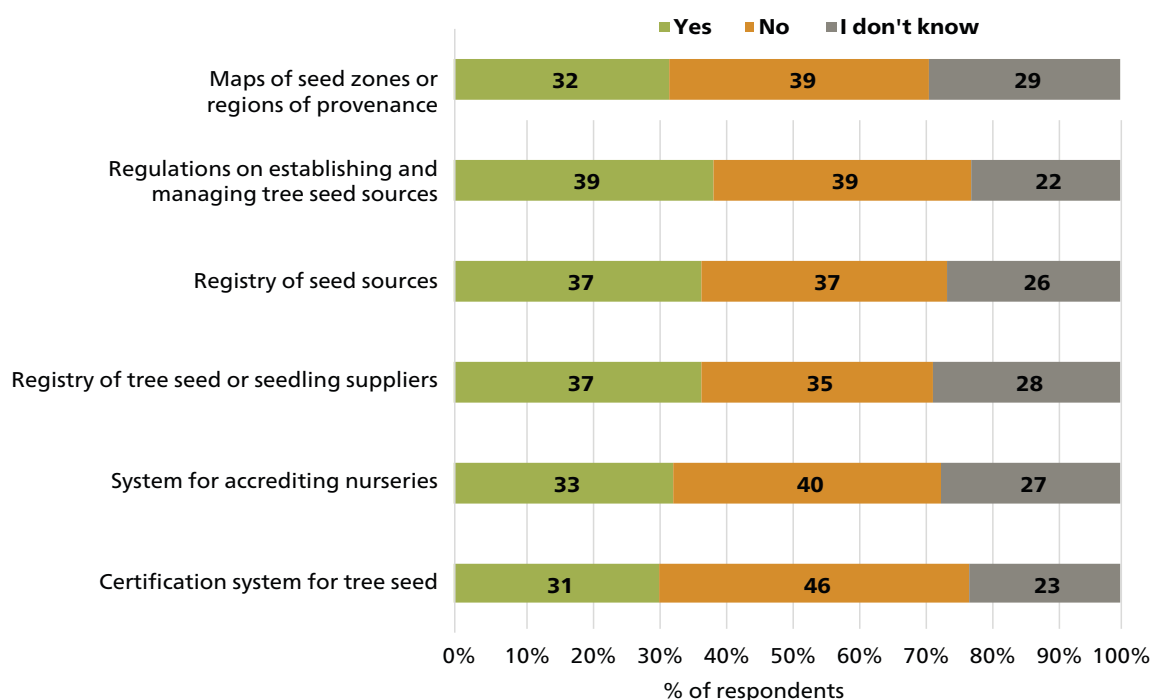


- Accept that you may have to work with multiple suppliers per species to get the required amount of material. This has its benefits – it helps get more diverse seed when suppliers' practices are unknown or limited, and when quality seed sources are lacking. It also allows smaller suppliers to participate in supply chains. Yet, 48 percent of practitioners considered that the inability of individual suppliers to supply large amounts of seeds and seedlings was a serious problem and preferred working with single suppliers when possible.
- Do not distribute free seedlings: while it may help reach project-specific planting targets, it severely hampers opportunities for local seedling suppliers and undermines the development of a viable seed sector. Yet, 36 percent of projects said that they still distributed seedlings for free.
- Consider the availability and quality of seed sources also when relying on natural regeneration. Large seed sources are needed in the vicinity of the target sites to ensure that the recruits are sufficiently genetically diverse to start a healthy and resilient new population. Not all species produce seed every year, and seed dispersal may be affected by the loss of seed-dispersing animals.

Recommendations for policymakers and funders

- Develop sector-level resources, standards, guidelines and databases to support individual projects and practitioners in seed sourcing. Up to half of surveyed practitioners reported that seed zone maps, registries of seed sources and suppliers were lacking in their countries (Figure 3). Records of seed collections and mechanisms for documenting and verifying seed origin and quality were also widely perceived to be helpful, as 39–41 percent of respondents reported that lack of information on the origin and quality of seeds and seedlings was a severe or very severe problem. These planning resources are critical for supporting effective and efficient restoration and must be prioritized for development where they do not exist – it is both impractical and unrealistic to leave this task to individual projects. The resources must also be made easily accessible and regularly updated. For example, although 50 percent of respondents reported that information about the impacts of climate change on ecosystems and species was available in their countries, 78 percent said that they still lacked knowledge about climate change impacts on their restoration sites and about strategies for sourcing resilient seeds and seedlings to respond to climate risks.
- Document and protect existing high-quality seed sources and support the establishment of new seed sources when adapted seed sources are lacking or inadequate to provide the quantities needed. Almost half of respondents (43 percent) reported that lack of seed sources was a severe problem, which likely contributed significantly to the reported delays and cost increases, and resulted in restored forests of low genetic diversity, productivity and adaptive capacity. It takes several years for planted trees to start to produce seed. Therefore, the establishment of seed sources is urgently needed if the global restoration targets of the United Nations Decade on Ecosystem Restoration are to be met. In principle, restored forests can also serve as seed sources for future restoration efforts. However, they are currently largely

Figure 3. Availability of key resources for forest and landscape restoration planning at country level, according to survey respondents



Large sector-wide projects can support the development of resources to meet the needs of smaller projects and local actors

The survey results were analysed separately for participants of The Restoration Initiative (TRI), a global programme of the Global Environment Facility (GEF) implemented collaboratively by the Food and Agriculture Organization of the United Nations (FAO), International Union for Conservation of Nature (IUCN) and the United Nations Environment Programme (UNEP). The programme aims to strengthen capacities for restoration in 12 countries. The findings show that TRI respondents were more aware than other respondents of the availability of planning resources such as registries and standards for seed sources and seed quality in their respective countries, and that they also used these resources in their projects when available. Hence, the TRI projects appear to have increased awareness among participants of the importance of seed and seedling quality and availability. Nevertheless, many resources are still not available or are considered difficult to access even in TRI countries. Moreover, fewer than 50 percent of TRI respondents reported availability of quality assurance mechanisms such as regulations for seed sources, nursery accreditation or even registries of seed sources or suppliers.

Importantly, large, well-funded international projects could strengthen sector-wide capacities for restoration in low- and middle-income countries by developing resources, standards, databases and registries, which would then benefit smaller projects and restoration efforts by local actors. It is recommended that future large-scale projects include such components in sectoral capacity development, beyond field-level targets related to the area of restored ecosystems or the communities engaged.

Seedlings of shea tree (*Vitellaria paradoxa*)

National Tree Seed Center of Burkina Faso





unsuitable as sources because of the evidence of poor seed collection practices and lack of information on seed origin.

- Review allocated time and budgets for completing restoration projects. It is widely reported that current timelines and budgets are inadequate to pay sufficient attention to seed and seedling quality. Twenty-five percent of practitioners reported being affected by severe time constraints when identifying suitable seed sources and suppliers, and 67 percent of them reported that lack of funding limited their ability to consider climate change in seed sourcing. Donors could require project implementers to submit plans for seed sourcing in order to support adequate planning and budgeting, and to avoid problems with seed availability and quality.
- Support the development of local entrepreneurial activities in seed and seedling supply chains, focusing on youth and marginalized groups such as women. Publicly funded projects must support and not compete with private suppliers, or they end up distorting markets and hampering the development of viable supply chains that could provide sustained job and income opportunities to local actors. Signing sales contracts with local nurseries or seed collectors helps create and stabilizes demand for native tree seeds and seedlings. Provision of seed collection equipment and incentives to protect seed sources on private lands help boost seed availability and reduce production costs. Quality assurance mechanisms help reward suppliers for their efforts to collect and produce high-quality, diverse planting material, but quality assurance must be accompanied with capacity development for small entrepreneurs to allow them to participate in markets.



