Technical Assistance Report

Mongolia: Conservation of Forest Genetic Resources

(Financed by the Japan Fund for Poverty Reduction)

Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
FGRs	–	forest genetic resources
MET	–	Ministry of Environment and Tourism
TA	–	technical assistance

GLOSSARY

aimag	–	province
soum	–	district

NOTE
In this report, "$" refers to US dollars.

CONTENTS

Page

CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

1.	**Basic Data**			**Project Number:** 50012-001	
	Project Name	Conservation of Forest Genetic Resources	**Department /Division**	EARD/EAER	
	Country	Mongolia	**Executing Agency**	Ministry of Environment and Tourism	

2.	**Sector**	**Subsector(s)**	**Financing ($ million)**
✔	Agriculture, natural resources and rural development	Forestry	0.50
		Total	**0.50**

3.	**Strategic Agenda**	**Subcomponents**	**Climate Change Information**	
	Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Climate Change impact on the Project	Low
	Environmentally sustainable growth (ESG)	Natural resources conservation		

4.	**Drivers of Change**	**Components**	**Gender Equity and Mainstreaming**	
	Governance and capacity development (GCD)	Institutional development	No gender elements (NGE)	✔
	Knowledge solutions (KNS)	Knowledge sharing activities		
	Partnerships (PAR)	Bilateral institutions (not client government)		
		Official cofinancing		

5.	**Poverty and SDG Targeting**		**Location Impact**
	Geographic Targeting	No	Not Applicable
	Household Targeting	No	
	SDG Targeting	Yes	
	SDG Goals	SDG15	

6.	**TA Category:**	B

7.	**Safeguard Categorization**	Not Applicable

8. **Financing**

Modality and Sources	Amount ($ million)
ADB	**0.00**
None	0.00
Cofinancing	**0.50**
Japan Fund for Poverty Reduction	0.50
Counterpart	**0.00**
None	0.00
Total	**0.50**

9.	**Effective Development Cooperation**	
	Use of country procurement systems	No
	Use of country public financial management systems	No

I.   INTRODUCTION

1.   During the country programming mission in February 2016, the Government of Mongolia asked the Asian Development Bank (ADB) to provide capacity building technical assistance (TA) to address issues related to the conservation of forest genetic resources (FGRs). The TA is included in ADB's country operations business plan, 2016 for Mongolia.[1] ADB fielded a reconnaissance mission to Ulaanbaatar on 21 April 2016 and held a discussion with the Forest Policy and Coordination Department of the Ministry of Environment and Tourism (MET), the executing agency, on the TA project's expected impact, outcome, outputs, scope, rationale, cost estimates, financing plan, and implementation arrangements.[2] The design and monitoring framework is in Appendix 1.

2.   The TA project will support the government in implementing its forest laws and policies, particularly the implementation of the Law on Forest,[3] as well as the State Policy on Forest.[4] Increasing the forest cover to preserve the natural landscape and biodiversity in a sustainable way is a key objective of the State Policy on Forest. The Law on Forest stipulates to use only FGRs from officially approved sources in appropriate forest seed zones for artificial regeneration. This requires developing legal frameworks for access to and certification of FGRs. The TA project will support the government in developing FGR-related decrees and building capacity in FGR management.

II.   ISSUES

3.   Mongolia has a unique natural landscape and biodiversity with valuable FGRs. FGRs are the heritable materials maintained within and among tree species that are of economic, environmental, scientific, or societal value. They are crucial to the adaptation and protection of Mongolia's ecosystems, landscapes, and production systems, yet are subject to increasing pressures and unsustainable use. Climate change and other anthropogenic factors are decreasing forest cover. Climate models indicate that temperatures will continue to rise, and more than 80% of the country's territory is defined as highly vulnerable to climate extremes.[5] Climate-related disasters with high social and economic costs, including droughts, severe storms, and flash floods, have doubled in frequency since 1997. In forest ecosystems, the main climate change impact is decreasing forest cover due to the expansion of the steppe and the desert.

4.   A lack of FGR conservation strategies, especially a forest seed selection and conservation strategy, has resulted in FGR degradation in Mongolia. National and subnational strategies are critical missing pieces for Mongolia's conservation of FGRs and their sustainable use. Strategies for the development of a forest seed conservation business plan is needed to support the conservation of key FGRs and their evolutionary abilities for the future. Defining and implementing conservation strategies provides a good justification for coordinating, collaborating, and making cost-effective investments in conserving forest seeds. The TA project will develop national and subnational strategies, policy tools, and standards for the conservation of forest seeds and their sustainable use.

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[1] ADB. 2016. *Country Operations Business Plan: Mongolia, 2016.* Manila.
[2] The TA first appeared in the business opportunities section of ADB's website on 31 March 2016.
[3] Government of Mongolia. 2012. *Mongolia Law on Forest.* Ulaanbaatar (17 May).
[4] Government of Mongolia. 2015. *Parliament Resolution No. 49: State Policy on Forest.* Ulaanbaatar (14 May).
[5] ADB. 2014. *Interim Country Partnership Strategy: Mongolia, 2014–2016.* Manila.

5.   Sustainable forest regeneration depends on the appropriate selection and use of high-quality seeds for different forest vegetation regions. Mongolia can be divided into three forest vegetation regions: Central Asia, mountain range, and south. Since 2012, forest management line agencies (forest units) have established permanent forest seed collection sites with funding support from the government. The purpose of these sites is to prepare high-quality forest seeds for forestation. Due to funding and human resources capacity constraints, the government has not been able to take the required steps for the development of a forest seed development business model. The TA project will identify sustainable forest seed plantations (forest seed stands) to supply high-quality forest seeds for forest regeneration purposes and strengthen forest staff capacity in required forest seed selection techniques.

6.   Increasing the forest-covered area through forest restoration and afforestation requires an increasing quantity and quality of selected FGRs for seedling preparation. Selection and certification of FGRs in registered forest seed stands is an important means for in situ conservation and propagation of adapted and resilient forest seeds for forest seedling preparation and plantation.

7.   The lack of trained personnel is a major impediment to developing and implementing FGR strategies and projects. Capacity building is crucial to providing the skills needed to manage FGRs. The projects of two other development partners, the Government of the Czech Republic [6] and German development cooperation through Deutsche Gesellschaft für Internationale Zusammenarbeit, also contribute to the development of FGRs by providing a related policy and legal-administrative framework. [7] The TA project can therefore build on achievements in this area and will implement complementary activities.

III.   THE CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE

A.   Impact and Outcome

8.   The impact will be an increase in the resilience of forest ecosystems to climate change. The outcome will be the improved management of forest seed stands. The TA project will assess and identify forest seed stands in natural forests and develop proposals for necessary government decrees for the establishment of forest seed stands. The TA project will focus on capacity-building activities with concerned stakeholders on all aspects of forest seed stand management. A key TA performance indicator is the implementation of a national registry on forest seed stands by the MET (Appendix 1). The national registry on forest seed stands will define the required data for seed stands, selection criteria for approval, and process of approval of seed sources.

B.   Methodology and Key Activities

9.   The TA project will deliver three main outputs: (i) identification of forest seed stands within forest regions of Mongolia, (ii) development of national registry on forest seed stands, and (iii) establishment and strengthening of educational and research capacities on FGRs. Potential risks involved in delivering the outputs of this TA include the following: (i) natural disasters may destroy forest seed stands or seeds in storage, and (ii) public and private stakeholders lack incentives and understanding of the capacity-building needs on forest genetic resources.

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[6] Government of the Czech Republic. 2015. *Development of Forest and the Gene Pool of Local Forest Tree Ecotypes in Mongolia.* Prague.

[7] Government of Germany. 2015. *Biodiversity and Adaptation of Key Forest Ecosystems to Climate Change I & II.* Berlin.

10.   **Output 1: Forest seed stands within forest regions of Mongolia identified.** This output focuses on the identification of high-quality seed stands for the purpose of forest regeneration. To achieve this output, the following key activities are anticipated: (i) develop a work plan for the rapid assessment of forest seed stands in the forest areas of Mongolia; (ii) assess and identify high-quality forest seed stands, including for their resilience to climate change, for conifer trees and broad-leaved trees in three forest vegetation regions; (iii) analyze forest seed stands data and prepare a scientific publication of the findings on forest seed regions; (iv) register and publish seed stand site locations for conservation; (v) assess seed yields and the quality of identified seed stands; (vi) develop a framework and guidelines to assess forest yields for an MET booklet; (vii) review and update forest seed collection criteria; (viii) review and update instructions on seed tree climbing for seed collection; (ix) develop a manual on tree seed management based on an updated forest seed collection criteria and seed tree climbing instructions; and (x) develop a manual on tree nursery management based on an assessment of tree nursery practices (seedling processing, storage, and outplanting) in three *aimags* (provinces) in Mongolia: Khentii, Khuvsgul, and Selenge.[8]

11.   **Output 2: National registry on forest seed stands developed.** This output focuses on developing proposals for government decrees and guidelines on the improved management of forest seed stands. Activities to achieve this output include the following: (i) conduct a field study in three *aimags* (Khentii, Khuvsgul, and Selenge) to identify constraints, opportunities, and capacity gaps for the conservation of forest seeds; (ii) review and update a proposal for a national registry on forest seed stands; (iii) review and update a proposal for a national standard for the establishment of permanent and impermanent forest seed stands; (iv) register permanent forest seed collection sites and collection seeds; and (v) develop a program for the conservation of forest seed genetic resources in seed storage facilities.

12.   **Output 3: Educational and research capacities on forest genetic resources established and strengthened.** This output will provide capacity building to provide adequate technical support to forest seed conservation programs. Training activities will target poverty-stricken local forest user groups. This will support project sustainability by providing poor and unemployed forest user group members with income-generation activities stemming from the collection and selling of seeds. The following key activities will be conducted: (i) develop training curricula and teaching materials for (a) seed passport certificate elaboration; (b) seed collection, including by seed tree climbing; (c) seed treatment, testing, and storage; (d) seed treatment for sowing; (e) tree nursery activities for different tree species and seedling production targets (e.g., age, dimensions); and (f) site-adapted use of forest seedlings within afforestation, reforestation, and enrichment plantation activities; (ii) develop, in consultation with the MET at the central and *aimag* levels, training modules, training agendas, and a list of targeted participants for specific training programs; and (iii) conduct training in three *aimags* (Khentii, Khuvsgul, and Selenge) for *aimag* and *soum* (district) forest unit employees, rangers, private tree nursery company employees, and forest user groups on (a) seed passport certificate elaboration; (b) seed collection, including by seed tree climbing; (c) seed treatment, testing, and storage; (d) seed treatment for sowing; (e) tree nursery activities for different tree species and seedling production targets (e.g., age, dimensions); and (f) site-adapted use of forest seedlings within afforestation, reforestation, and enrichment plantation activities.

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[8] Planned submission of scientific publication to *Forest Ecology and Management*, a journal published by Elsevier.

C.   Cost and Financing

13.   The TA is estimated to cost $550,000, of which $500,000 will be financed on a grant basis by the Japan Fund for Poverty Reduction and administered by ADB. The government will provide counterpart support in the form of counterpart staff, office space, office supplies and equipment, administrative support, and other in-kind contributions. The cost estimates and financing plan are in Appendix 2.

D.   Implementation Arrangements

14.   The Forest Policy and Coordination Department of the MET will be the executing agency. A TA management office will be established to coordinate with ADB, providing guidance on TA implementation issues and ensuring intra- and interdepartmental coordination. The MET will initiate the establishment of an interministerial project steering committee. The TA management office will be responsible for day-to-day operational matters among ADB, consultants, and government agencies.

15.   The TA will be implemented for 24 months from 1 December 2016 to 30 November 2018. The TA will require 6 person-months of international and 60 person-months of national consulting services and 10 person-days of international resource person inputs. For the national consulting services, a consulting firm will be engaged using a simplified technical proposal and the quality- and cost-based selection method, with a quality–cost ratio of 90:10. Interest from international firms to provide only one international consultant to be associated with a national firm is expected to be low. Therefore, the international consultant will be recruited through the individual consultant selection procedure. Consultants will be engaged in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time).[9] It is anticipated that the consultants will be mobilized during the first quarter of 2017. Appendix 3 provides the outline terms of reference of consultants. TA funds will be disbursed following the *Technical Assistance Disbursement Handbook* (2010, as amended from time to time).

16.   The TA will follow the standard monitoring and supervision procedures for ADB-administered TA projects. ADB will carry out monitoring and review missions at the TA inception, interim, and final phases. During these missions, ADB, the executing agency, the consultants, and stakeholders will review the TA technical progress and provide feedback to improve the TA. Progress will be measured against the targets and indicators in the design and monitoring framework (Appendix 1) and the consultants' terms of reference, and reported in TA progress reports. ADB and local experts will review the progress reports to provide additional feedback and guidance. All TA reports will be made available on ADB's website.

IV.   THE PRESIDENT'S DECISION

17.   The President, acting under the authority delegated by the Board, has approved ADB administering technical assistance not exceeding the equivalent of $500,000 to the Government of Mongolia to be financed on a grant basis by the Japan Fund for Poverty Reduction for the Conservation of Forest Genetic Resources, and hereby reports this action to the Board.

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[9]   Lump-sum payments and/or output-based contracts will be considered under the TA in line with the Midterm Review action plan Nos. 2.9.2 and 2.10.2. ADB. 2014. *Midterm Review of Strategy 2020: Action Plan.* Manila.

DESIGN AND MONITORING FRAMEWORK

Impact the TA is Aligned with
Resilience of forest ecosystems to climate change increased (Mongolia's 2030 Sustainable Development Vision)[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
Outcome Management of forest seed stands improved	By December 2019: A national registry on forest seed stands implemented by the MET. (2016 baseline: not applicable)	TA report reviews. Annual activity report by the Forest Policy and Coordination Department of the MET.	Public and private stakeholders lack incentives and understanding of the implementation of the forest genetic seed pool.
Outputs 1. Forest seed stands within forest regions of Mongolia identified	By November 2018: 1a. Report submitted on identified forest seed regions and seed stands with species, respective seed quality, and yield assessed for conifer and broad-leaved trees. (2016 baseline: not applicable) 1b. Research paper and map (scale 1:1,000,000) with identified forest seed regions discussed in and submitted to scientific conferences. (2016 baseline: not applicable) 1c. Booklet with framework or guideline to assess forest seed yields published by the MET. (2016 baseline: not applicable) 1d. Technical guideline or manual on tree seed management (criteria for seed sources, seed collection, seed tree climbing, and seed handling) published by the MET. (2016 baseline: not applicable)	1a. Consultant reports on forest seed regions and seed stands; one report each for Central Asia, mountain range, and south forest vegetation regions. 1b. Conference proceedings of scientific journals of submitted research paper. 1c–d. MET publication.	Natural disasters destroy forest seed stands or seeds in storage. Public and private stakeholders lack incentives and understanding of the capacity-building needs on forest genetic resources.
2. National registry on forest seed stands developed	2a. Proposal for national registry on forest seed stands adopted by the MET. (2016 baseline: not applicable) 2b. Proposal for a national standard for the establishment of permanent and impermanent tree seed stands adopted by the MET.	2a. Consultant report on proposal for national registry on forest seed stands; MET annual report on issued directives. 2b. Consultant report on the proposal for a national standard for the establishment of	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
	(2016 baseline: not applicable)	permanent and impermanent tree seed stands; MET annual report on issued directives.	
	2c. Proposal for a forest seed conservation program using seed storage facilities developed. (2016 baseline: not applicable)	2c. Consultant report on forest seed conservation program using seed storage facilities.	
3. Educational and research capacities on forest genetic resources established and strengthened	3a. Training curricula and teaching materials for seven types of teaching materials prepared. (2016 baseline: not applicable)	3a. Consultant reports with training curricula and materials.	
	3b. Training conducted in three *aimags* (provinces) (Khentii, Khuvsgul, and Selenge) with *aimag* and *soum* (district) forest unit employees, rangers, tree nursery private company employees, and forest user groups on (i) seed passport certificate elaboration; (ii) seed collection, including by seed tree climbing; (iii) seed treatment, testing, and storage; (iv) seed treatment for sowing; (v) tree nursery activities for different tree species and seedling production targets (e.g., age, dimensions); and (vi) site-adapted use of forest seedlings within afforestation, reforestation, and enrichment plantation activities. (2016 baseline: not applicable)	3b. Training reports for subject training.	

Key Activities with Milestones
1. Forest seed stands within forest regions of Mongolia identified.
1.1   Develop a work plan for the rapid assessment of forest seed stands in the forest areas of Mongolia (Q2 2017).
1.2   Assess and identify high-quality forest seed stands, including for their resilience to climate change, for conifer trees and broad-leaved trees in three forest vegetation regions (Q3 2017).
1.3   Analyze forest seed stands data and prepare a scientific publication of the findings on forest seed regions (Q2 2017).
1.4   Register and publish seed stand site locations for conservation (Q4 2017).
1.5   Assess seed yields and the quality of identified seed stands (Q1 2018).
1.6   Develop a framework and guidelines to assess forest yields for an MET booklet (Q3 2017).
1.7   Review and update forest seed collection criteria (Q1 2018).
1.8   Review and update instructions on seed tree climbing for seed collection (Q1 2018).
1.9   Develop a manual on tree seed management based on updated forest seed collection criteria and

Key Activities with Milestones
seed tree climbing instructions (Q1 2018).

1.10 Develop a manual on tree nursery management based on an assessment of tree nursery practices (seedling processing, storage, and outplanting) in three *aimags* in Mongolia: Khentii, Khuvsgul, and Selenge (Q1 2018).

2. National registry on forest seed stands developed.
2.1   Conduct a field study in three *aimags* (Khentii, Khuvsgul, and Selenge) to identify constraints, opportunities, and capacity gaps for the conservation of forest seeds (Q2 2017).
2.2   Review and update a proposal for a national registry on forest seed stands (Q2 2017).
2.3   Review and update a proposal for a national standard for the establishment of permanent and impermanent forest seed stands (Q2 2017).
2.4   Register permanent forest seed collection sites and collect seeds (Q4 2017).
2.5   Develop a program for the conservation of forest seed genetic resources in seed storage facilities (Q4 2017) [G/CD].

3. Educational and research capacities on forest genetic resources established and strengthened.
3.1   Develop training curricula and teaching materials for subject training (Q1 2018).
3.2   Develop, in consultation with the MET at the central and *aimag* levels, training modules, training agendas, and a list of targeted participants for specific training programs (Q2 2018).
3.3   Conduct training in three *aimags* (Khentii, Khuvsgul, and Selenge) with *aimag* and *soum* forest unit employees, rangers, tree nursery private company employees, and forest user groups (Q3 2018) [G/CD].

TA Management Activities
Mobilize team of experts (Q1 2017).
Develop study framework, prepare inception report, and organize and conduct inception workshop (Q2 2017).
Prepare interim TA report and conduct interim workshop (Q1 2018).
Prepare draft final TA report (Q3 2018).
Hold a final TA workshop (Q4 2018) [KNS].
Finalize the TA outputs (Q4 2018).

Note: All consultant and TA reports will be submitted in English to the Asian Development Bank.

Inputs

Japan Fund for Poverty Reduction: $500,000

Note: The government will provide counterpart support in the form of counterpart staff, office space, office supplies and equipment, administrative support, and other in-kind contributions.

Assumptions for Partner Financing

Not applicable.

G/CD = governance and capacity development, KNS = knowledge solutions, MET = Ministry of Environment and Tourism, Q = quarter, TA = technical assistance.
[a] Government of Mongolia. 2016. *Sustainable Development Vision, 2030*. Ulaanbaatar.
Source: Asian Development Bank estimates.

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Amount
Japan Fund for Poverty Reduction[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	120.0
ii. National consultants	177.0
b. International and local travel	41.0
c. Reports and communications	5.0
2. Training, workshops, and conferences[b]	74.0
3. Surveys	20.0
3. Miscellaneous administration and support costs[c]	25.0
4. Contingencies	38.0
Total	**500.0**

Note: The technical assistance (TA) is estimated to cost $550,000, of which contributions from the Japan Fund for Poverty Reduction are presented in the table above. The government will provide counterpart support in the form of counterpart staff, office space, office supplies and equipment, administrative support, and other in-kind contributions. The value of government contribution is estimated to account for 9% of the total TA cost.
[a] Administered by the Asian Development Bank.
[b] Includes participants' travel-related insurance costs for workshops.
[c] Includes interpretation and translation costs.
Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A.   Introduction

1.   It is estimated that the technical assistance (TA) will require 6 person-months of international and 60 person-months of national consulting services, and one individual international resource person. The deployment will be in Ulaanbaatar, with field activities in three *aimags* (Khentii, Khuvsgul, and Selenge) in the forest vegetation regions of Mongolia.

2.   The Asian Development Bank (ADB) will engage a consulting firm for the national consulting positions following the Guidelines on the Use of Consultants (2013, as amended from time to time), using a simplified technical proposal and the quality- and cost-based selection method with a quality–cost ratio of 90:10. The successful consulting firm will have prior experience and demonstrated expertise in capacity building for government agencies in the forest sector in Mongolia. Under the supervision of ADB, the Forest Policy and Coordination Department of the Ministry of Environment and Tourism (MET), and the Forest Research and Development Center, the firm will (i) lead TA implementation; (ii) manage the consultant team; (iii) facilitate and promote the involvement of civil society organizations; (iv) support the active involvement of international resource persons, particularly in workshops; (v) prepare and conduct workshops and conferences, and facilitate training and field activities; and (vi) use the firm's pool of national and/or international expertise, as necessary, to achieve the TA outputs. To realize synergies and avoid redundancies, the consulting firm will coordinate with ongoing programs by other development partners, such as the Food and Agriculture Organization of the United Nations, the Global Environment Facility, the Czech Development Agency, and German development cooperation through Deutsche Gesellschaft für Internationale Zusammenarbeit. The international consulting position will be recruited through individual consultant selection.

Table A3: Summary of Consulting Expertise

International Position[a]	Person-Months	National Positions[b]	Person-Months
Forest seed development specialist	6	Team leader and forest seed management specialist	18
		Deputy team leader and forest seed stands specialist	18
		Forest seed management capacity development specialist	18
		Forest seed quality specialist	6
Total	**6**		**60**

[a] To be recruited through individual consultant selection.
[b] Firm will be recruited.
Source: Asian Development Bank estimates.

B.   Terms of Reference

3.   **Team leader and forest seed management specialist** (national, 18 person-months). The consultant should have a degree in forestry or a related field and at least 8 years of project-relevant professional experience. The team leader will have overall substantive and administrative responsibility for the effective and timely implementation of the TA project. The team leader will guide the team; foster close coordination between team members (including coordination of inputs, quality control of reports, and technical guidance); and coordinate with the executing agency, other related government agencies, ADB, and international organizations undertaking related work in partnership with ADB. As a forest seed management specialist, the team leader will

(i)   conduct a field study in three *aimags* (Khentii, Khuvsgul, and Selenge) in forest vegetation regions to assess constraints, opportunities, and capacity gaps for the conservation of forest seeds;

(ii)   review and update a proposal for a national registry on forest seed stands;

(iii)   review and update a proposal for a national standard for the establishment of permanent and impermanent forest seed stands based on a proposal from a forest seed development specialist;

(iv)   register permanent forest seed collection sites;

(v)   develop a manual on tree nursery management based on an assessment of tree nursery practices (seedling processing, storage, and outplanting) in the three *aimags*;

(vi)   conduct karyology and a growth study on seedlings in an established nursery and publish results in a scientific journal;

(vii)   develop a proposal for a program on the conservation of forest seeds using seed storage facilities;

(viii) review and update a report on forest seed regions;

(ix)   prepare an inception, interim, and final TA report comprising findings of field studies and reviews; and

(x)   carry out other related work as assigned by the ADB project officer.

4.   **Deputy team leader and forest seed stands specialist** (national, 18 person-months). The consultant should have a degree in forestry or a related field and at least 8 years of project-relevant professional experience. The consultant will have overall responsibility for research and capacity building related to forest seed stands. The specialist will undertake the following tasks:

(i)   develop a work plan for the rapid assessment of forest seed stands in three forest vegetation regions (the *aimags* of Khentii, Khuvsgul, and Selenge);

(ii)   assess and identify high-quality forest seed stands for conifers and broad-leaved trees in the three forest vegetation regions and summarize findings in a study report on forest seed regions;

(iii)   define forest seed regions and produce a forest seed region map;

(iv)   prepare a forest seed region research paper for publication in a forest seed scientific journal;

(v)   assess and publish seed yields and the quality of identified seed stands;

(vi)   develop training material on the establishment of forest seed stands;

(vii)   develop a framework and guidelines to assess forest yields for publication as an MET booklet;

(viii) register and publish seed stand site locations for conservation;

(ix)   review and update forest seed collection criteria;

(x)   review and update instructions on seed tree climbing;

(xi)   develop a manual on tree seed management based on updated forest seed collection criteria, seed tree climbing instructions, and summarized best practices from a forest seed development specialist;

(xii)   conduct a knowledge sharing workshop to discuss and disseminate study findings; and

(xiii) submit inputs for the inception, interim, and final TA report to the team leader.

5.   **Forest seed management capacity development specialist** (national, 18 person-months). The consultant should have a degree in forestry or a related field and at least 5 years of project-relevant professional experience. The specialist will undertake the following tasks:

(i) develop, in consultation with the MET at the central and *aimag* levels, training modules, training agendas, and targeted participant lists for specific training programs;

(ii) conduct training in three *aimags* with *aimag* and *soum* forest unit employees, rangers, private company employees, and forest user groups on (a) seed passport certificate elaboration; (b) seed collection, including by seed tree climbing; (c) seed treatment, testing, and storage; (d) seed treatment for sowing; (e) tree nursery activities for different tree species and seedling production targets (e.g., age, dimensions); and (f) site-adapted use of forest seedlings within afforestation, reforestation, and enrichment plantation activities; and

(iii) submit an inception, interim, and final TA report to the team leader.

6. **Forest seed quality specialist** (national, 6 person-months). The consultant should have a degree in forestry or a related field and at least 5 years of project-relevant professional experience. The specialist will undertake the following tasks:

(i) conduct a pollen, embryology, and karyology study on forest seeds and summarize findings in a study report;

(ii) conduct a seed genetic selection assessment;

(iii) measure seed quality using factors such as seed germination and seed weight;

(iv) prepare a genetic assessment report covering conifer and broad-leaved trees for publication as a scientific research paper; and

(v) submit inputs for the inception, interim, and final TA report to the team leader.

7. **Forest seed development specialist** (international, 6 person-months). The consultant should have a postgraduate degree in forestry or a related field and at least 8 years of project-relevant professional experience. The specialist will undertake the following tasks:

(i) review international best practices in forest seed management and summarize the application of the identified best practices in the guidelines on forest seed management for Mongolia;

(ii) review international standards on the establishment of permanent and impermanent tree seed stands and summarize the application of the identified best practices in a proposal for a Mongolian national standard on the establishment of permanent and impermanent tree seed stands;

(iii) develop, in consultation with the forest seed management capacity development specialist, training curricula and teaching materials for (a) seed passport certificate elaboration; (b) seed collection, including by seed tree climbing; (c) seed treatment, testing, and storage; (d) seed treatment for sowing; (e) tree nursery activities for different tree species and seedling production targets (e.g., age, dimensions); and (f) site-adapted use of forest seedlings within afforestation, reforestation, and enrichment plantation activities;

(iv) advise the MET and seed researchers on forest seed regions;

(v) prepare a study report on assessed forest seed regions and seed stands within forest vegetation regions in Mongolia; and

(vi) prepare and submit a draft and final consultant report to ADB.

8. **Resource person on forest seed management** (international, 10 person-days). The resource person should hold a position in an institution or environment relevant to forest seed management, such as in a forestry research institution, consulting entity, or government agency. The resource person will comment on the field study design and data collection tools, prepare workshop interventions, and participate in interim and final TA workshops. The resource person

will provide insights into national and international good practices and lessons on forest seed management, as applicable to Mongolia.