



# **Natural Resource Conservation and Development.**

**Level - II**

## **Learning Guide #52**

**Unit of Competence: Facilitate in Performing Ex-Situ Conservation Measures**

**Module Title: Facilitating in Performing Ex-Situ Conservation Measures**

**LG Code: AGR NRC2M12 1019.**

**TTLM Code: AGR NRC2 TTLM121019 V1.**

**LO.1. Identifying and Prioritizing  
Endangered species**



<b>Instruction Sheet</b>	<b>Learning Guide #52</b>
--------------------------	---------------------------

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Identify and prioritize endangered species
- Collect, store and propagate planting materials
- Carry out planting activities for ex-situ conservation
- Record and Report Information.

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- Conduct forest resources assessment
- Identify endangered species
- Collect and store endangered species at field and gene bank
- Accessing and utilizing information sources

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 6.
3. Read the information written in the “Information Sheets 1, Sheets 2, Sheets 3, Sheets 4”.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, Self-check 4.” **in page -3, 7, 10, 12.** respectively
5. If you earned a satisfactory evaluation proceed to “Information Sheet 2.
6. Submit your accomplished Self-check. This will form part of your training portfolio.



<b>Information Sheet-1</b>	<b>Conducting forest resources assessment</b>
----------------------------	---

## **1.1. Conducting forest resources assessment.**

### **Introduction**

**Ex-situ conservation** means literally, "off-site conservation". It is the process of protecting an endangered species of plant or animal outside of its natural habitat. for example, by removing part of the population from a threatened habitat and placing it in a new location, which may be a wild area or within the care of humans.

**Ex situ conservation** is the conservation and maintenance of samples of living organisms outside their natural habitat, in the form of whole plants, seed, and pollen, vegetative propagates tissue or cell cultures.

The conservation status of a species is an indicator of the likelihood of that endangered species not living. Many factors are taken into account when assessing the conservation status of a species; not simply the number remaining, but the overall increase or decrease in the population over time, breeding success rates, known threats, and so on.

### **Ex situ conservation has several purposes:**

- Rescue threatened germplasm.
- Produce material for conservation biology research.
- Bulk up germplasm for storage in various forms of ex situ facility.
- Supply material for various purposes to remove or reduce pressure from wild collecting.
- Grow those species with recalcitrant seeds that cannot be maintained in a seed store.
- Make available material for conservation education and display.
- Produce material for reintroduction, reinforcement, habitat restoration and management.

This involves conservation of genetic resources, as well as wild and cultivated or species, and draws on a diverse body of techniques and facilities.



Some of these include:

- Gene banks, e.g. seed banks, sperm and ova banks, field banks;
- In vitro plant tissue and microbial culture collections;
- Captive breeding of animals and artificial propagation of plants, with possible reintroduction into the wild; and
- Collecting living organisms for zoos, aquaria, and botanic gardens for research and public awareness.

A broad range of materials exists can be conserved in *ex situ*, including:

- **Wild and weedy species:** belonging to cultivated genera that constitute a broad and varied range of important materials for research and crop.
- **Varieties from traditional agriculture:** landraces, primitive cultivars and species of cultural importance (e.g. those used in religious ceremonies).
- **Products of scientific improvement programs:** for example, modern and obsolete cultivars, advanced lines, mutants and synthetic materials.
- **Products of biotechnology and genetic engineering** that include, among other products, transgenic plants, DNA fragments, and cloned genes.

State-wide Assessment of Forest Resources; provides an analysis of forest conditions and trends in the state and delineates priority rural and urban forest landscape areas.

The state forest resource assessment should provide a comprehensive analysis of the forest-related conditions, trends, threats, and opportunities within the state.

**At a minimum, state forest resource assessments will:**

- ✚ Provide an analysis of present and future forest conditions, trends, and threats on all ownerships in the state using publicly available information.
- ✚ Identify forest related threats, benefits, and services
- ✚ Delineate priority rural and urban forest landscape areas to be addressed by the state resource strategy. States can also identify linkages between terrestrial and aquatic habitat, as appropriate.

However, the objective of conducting forest resources assessment in this case is to identify *endangered species* prioritizing *endangered species* to be collected and stored at fields and *gene bank*.



**Self-Check – 1**

**Written Test**

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page.

1. What is Ex-situ conservation? (2pts.)
2. Why we Conduct forest resources assessment? (2pts)
3. What is the purpose of conserving ex-situ? (3pts)

**Note: Satisfactory rating - 4 points**

**Unsatisfactory - below 4 points**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



<b>Information Sheet-2</b>	<b>Identifying Endangered species</b>
----------------------------	---------------------------------------

## 1.2. Identifying endangered species

Endangered species is an endangered species is a population of organisms which is at risk of becoming extinct because it is either few in numbers, or threatened by changing environmental or predation parameters.

They are species that are on the verge of being extinct. endangered species lists those species at risk of disappearing. The list classifies the species into seven categories according to the degree of threat to which they are subjected at a given time. The categories are:

- **Extinct:** A *taxon* is considered as extinct when it is known with certainty that the individuals composing it have died.
- **Extinct in nature:** A taxon is considered as extinct in nature when it is known only under cultivation, and when studies of the habitats (exhaustive, at appropriate times and across the taxon's entire historical range) do not find an individual.
- **Critically endangered:** When the risk of the species becoming extinct in nature, and in the immediate future, is extremely high.
- **Endangered:** When the risk of the species becoming extinct in nature, and in the immediate future, is high.
- **Vulnerable:** When the species is in danger but is neither 'critically endangered' nor 'endangered'. This category can be divided into three subcategories:
  - ✓ **Conservation dependent:** The targeted species is under continuous conservation, the suspension of which would bring it to the status of 'threatened' within a period of about 5 years.
  - ✓ **Near threatened:** The targeted species is not classified as being 'conservation dependent' but is sufficiently close to classify it as 'vulnerable' or 'at risk'.
  - ✓ **Least concern:** Targeted species that do not fall under the two previous subcategories.



- Deficiently documented species: When the information available on the distribution and/or state of a species' populations does not reliably indicate the degree of danger of extinction in which it is. A species in this category can pass to one of either 'threatened' or 'at low risk'.
- Not evaluated: When a species has not been evaluated as to whether it is at risk or not.

There are different categories of rarity and endangerment based on the following parameters.

- Geographic range: species confined to a small geological range, but may be numerous where they occur.
- Habitat specify: a species may geographically wide spread, but confined to very specialized habitat.
- Population size: where a species occurs there may always be only a small population.

Conservation efforts are needed for threatened species whose survival cannot be guaranteed by conserving their habitat alone.

World wide fund in nature conservation/WWF is focusing efforts on a selected group of priority species that are especially important.

Strategically focusing efforts on these species will also help conserve the many other species which share their habitats and/or are vulnerable to the same threats.

In order for species conservation to be successful, we must know which species are most in need of attention, and direct appropriate conservation action towards them. There are several lists that are used to identify at risk species, both domestically and internationally. The U.S. Endangered Species List, maintained by the U.S. Fish and Wildlife Service, contains all the U.S. species and sub-species that have been determined by the federal government to be in immediate danger of extinction.

The Endangered Species Act, under which the list is maintained, protects these species, and also has the provision to protect certain places, designated as Critical Habitat, for the full recovery of the listed animal or plant.

Endangered Species Act Report has analyzed the benefits to species of this act in depth, and concluded that it is one of the most important pieces of legislation currently in effect for rare species, requiring appropriate funding to enable conservation efforts to be fully effective in restoring populations.



Finally, it is important therefore is that giving priority to the endangered species to be collected and stored at fields and gene banks whenever working with ex-situ conservation.

***Lists of some endangered species.***

<b>No.</b>	<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>CONSERVATION STATUS</b>
1	Snow Leopard	<i>Panthera uncia</i>	Vulnerable
2	African Wild Dog	<i>Lycaon pictus</i>	Endangered
3	Amur Tiger	<i>Panthera tigris altaica</i>	Endangered
4	Asian Elephant	<i>Elephas maximus indicus</i>	Endangered
5	Bengal Tiger	<i>Panthera tigris tigris</i>	Endangered
6	Chimpanzee	<i>Pan troglodytes</i>	Endangered
7	Ganges River Dolphin	<i>Platanista gangetica gangetica</i>	Endangered
8	Mountain Gorilla	<i>Gorilla beringei beringei</i>	Endangered
9	Sea Lions	<i>Zalophus wollebaeki</i>	Endangered
10	Tiger	<i>Panthera tigris</i>	Endangered
11	Whale Shark	<i>Rhincodon typus</i>	Endangered
12	Amur Leopard	<i>Panthera pardus orientalis</i>	Critically Endangered
13	Black Rhino	<i>Diceros bicornis</i>	Critically Endangered
14	Cross River Gorilla	<i>Gorilla gorilla diehli</i>	Critically Endangered
15	Eastern Lowland Gorilla	<i>Gorilla beringei graueri</i>	Critically Endangered
16	Malayan Tiger	<i>Panthera tigris jacksoni</i>	Critically Endangered
17	Sumatran Elephant	<i>Elephas maximus sumatranus</i>	Critically Endangered





**Self-Check – 2**

**Written Test**

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page.

1. Define Endangered species? (3pts)
2. What is endangered species act? (3pts)
3. Write down the categories of rarity and endangered species (4pts)
4. List at list 5 endangered species (5 pts)

**Note: Satisfactory rating - 8 points**

**Unsatisfactory - below 8 points**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



<b>Information Sheet-3</b>	<b>Collecting and storing endangered species at field and gene bank</b>
----------------------------	---

### 1.3. Collecting and storing endangered species at field and gene bank

Ex situ conservation of germplasm includes a series of activities that begin with the collection/acquisition of material and can even include the use of this material or its loan for use.

Some aspects that should be taken into account when organizing and carrying out collecting expeditions are given below:

- Knowledge of the targeted species- Genetic variability, botany, ethnobotany, reproductive aspects, morphology, habitat and distribution, reaction to storage
- Knowledge of the region where the mission will be carried out
  - ✓ Eco geographic conditions
  - ✓ Social and cultural conditions
- Sampling strategy based on:
  - ✓ Knowledge of the species
  - ✓ Knowledge of the area's climate and topography, and its ecological and edaphic conditions
- Documentation that should be obtained in advance
- Itinerary with the routes and collecting sites based on:
  - ✓ Distribution of the targeted species, harvest times and/or fructification, access to the area
  - ✓ Knowledge of the local expert associated with the mission
  - ✓ Establishment of alternate routes
- Sources for compiling information before the mission



## **Storing germplasms**

**1. Gene bank-** Is area where planting materials are stored.

Gene banks are established to fulfil the conservation goals of a research institution, country or region. They conduct different activities that range from acquiring germplasm, studying their characteristics and potential usefulness, and ensuring their survival, to keeping it available for users and disseminating information that promotes its use. Usually, gene banks are attached to an institution or are in the charge of a group of people (curators) who have the capacity and resources to maintain the germplasm under optimal conditions for the required period.

Gene banks are classified according to sample type (seed; field, including botanic gardens and arboreta; or in vitro), number of species conserved (mono-, oligo- and poly specific) and the mandate of the institutions to which they are attached (institutional, national, regional or international).

### **2.Field storage**

Not all species can be conserved as seed even if they reproduce this way, and even less so if they are propagated vegetative. Recalcitrant and intermediate seeds are those that, even under optimal conditions, last only a few weeks, making their conservation in the field or in vitro easier.

Conservation in the field should be carried out for species that are perennial, arboreal, wild, semi-domesticated and heterozygous, or reproduce vegetative, or have seeds that are short-lived or sensitive to drying. Field conservation implies conditioning the material (if necessary), multiplying it, selecting a site, preparing it for planting, planting the materials and recording the accessions' precise location.



**Self-Check – 3**

**Written Test**

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page.

1. What aspects should be taken in to consideration during collecting materials? (3pts)
2. write methods storing germplasm? (3pts)
3. explain the word gene bank (4pts)

**Note: Satisfactory rating - 5 points**

**Unsatisfactory - below 5 points**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



<b>Information Sheet-4</b>	<b>Accessing and utilizing information sources</b>
----------------------------	--

#### **1.4. Accessing and utilizing information sources**

Information is interpreted data; created from organized, structured, and processed data in a particular context.

According to Davis and Olson:

"Information is a data that has been processed into a form that is meaningful to recipient and is of real or perceived value in the current or the prospective action or decision of recipient."

Information is a vital resource for the success of any organization. Future of an organization lies in using and disseminating information wisely. Good quality information placed in right context in right time tells us about opportunities and problems well in advance.

**Good quality information:** Quality is a value that would vary according to the users and uses of the information.

According to Wang and Strong, following are the dimensions or elements of Information Quality:

1. Intrinsic: Accuracy, Objectivity, Believability, Reputation
2. Contextual: Relevancy, Value-Added, Timeliness, Completeness, Amount of information
3. Representational: Interpretability, Format, Coherence, Compatibility
4. Accessibility: Accessibility, Access security
5. Reliability - It should be verifiable and dependable.
6. Relevant - It should be current and valid information
7. Accurate - It should be free of errors and mistakes, true, and not deceptive (misleading).
8. Sufficient - It should be adequate in quantity, so that decisions can be made on its basis.
9. Unambiguous - It should be expressed in clear terms. In other words, it should be comprehensive.
10. Complete - It should meet all the needs in the current context.
11. Explicit - It should not need any further explanation.



Types and Sources of Information may include,

- Organizational rules, regulation and guidelines
- Internet, related books and related materials
- Technical manuals
- Workplace guidelines
- Recorded documents/logo/history

### Need for Information

Managers make decisions. Decision-making generally takes a four-fold path:

- Understanding the need for decision or the opportunity
- Preparing alternative course of actions,
- Evaluating all alternative course of actions,
- Deciding the right path for implementation.

<b>Self-Check – 4</b>	<b>Written Test</b>
-----------------------	---------------------

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page.

1. what is Information? (3pts)
2. what is the importance of assessing information? (3pts)
3. List down at least four elements of Information Quality (4pts)

**Note:** Satisfactory rating - 5 points

Unsatisfactory - below 5 points

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



## List of Reference Materials

1. FAO (Food and Agriculture Organization of the United Nations). 1999. The FAO World Information and Early Warning System on plant genetic resources. <http://apps3.fao.org/wIEWS/>
2. IUCN 2019. The IUCN Red List of Threatened Species. Version 2019-2. <<https://www.iucnredlist.org>
3. Sildana J. and Margarita B. (2007). Ex-situ conservation of plant genetic resources, Training module, Biodiversity international.