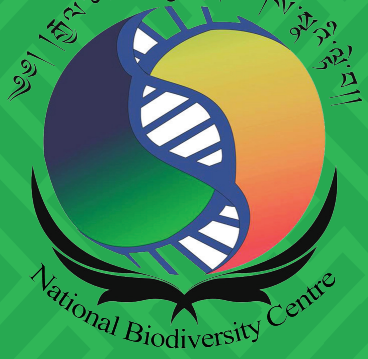

Structured Internship Program (SIP)

National Biodiversity Centre

Ministry of Agriculture and Forests
Serbithang, Thimphu

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Background

Every breath we take, every drop of water we drink and every mouthful of food we eat is dependent on biodiversity. Biodiversity remains a pivotal part of Bhutan's rich natural heritage. As an agrarian society, biodiversity holds great economic, social, ecological, cultural and spiritual importance and has always been a source of sustenance, tradition and spiritual well-being (Ministry of Agriculture and Forests, 2014). In fact biodiversity conservation is fundamental and imperative to guarantee our health, wealth, food security, fuel, services we depend on and is key to resilience to climate change. There is no development and prosperity without biodiversity conservation. Effective biodiversity conservation requires intervention from a range of organizations and it is the responsibility of every individual to conserve the biodiversity through their own actions.

Therefore, the structured internship program under the National Biodiversity Centre (NBC) is designed to provide students of environment and climate studies, life sciences, biology and other related subjects the opportunity for a substantive practical experiences and theoretical knowledge in the field of biodiversity conservation and sustainable utilization under various Programs at the NBC.

During the course of an internship at NBC, the students will be engaged in various programs and activities of the Centre and receive both theoretical lessons and hands-on experiences on biodiversity conservation. Practical sessions are planned simultaneously with the daily activities of the Centre to provide the students with actual work experiences in an institutional set up. The learning sessions at the NBC will complement their academic studies with both theory and workforce-skills components.

Over the years NBC hosted many students from various academic institutes both national and international. The internship service provided by the Centre was very much appreciated by the interns so much so that some of them chose to work at NBC after their graduation and having been selected as Civil Servants.

The Centre, up until now hosted interns on a rather ad hoc basis i.e.

whenever it was approached by students or anyone else who wanted to be attached to the Centre for varying durations to gain some work experience or for some additional knowledge and information on biodiversity. Despite the heavy workload of the Centre on its limited staff number, NBC never refused anyone seeking an attachment or an internship at the Centre. With the experiences gained over the years of hosting interns and attachés, NBC has now decided to mainstream the internship program as one of the regular programs of the Centre. The following are the main objectives of regularizing the internship program.

Objectives of the structured internship program

1. To avoid ad-hoc internship program and streamline the program at the Centre.
2. To enable the Centre to prepare comprehensive internship programs and lessons to host and engage the interns meaningfully.
3. To cater to the needs of the academic institutions.
4. To provide opportunities to the academic institutions to plan and engage students in biodiversity related learnings.
5. To establish coherence between the needs of the academic institutions and the expertise and facilities of various programs under NBC
6. To promote participation and commitments of academic institutions, students and individuals in the conservation and sustainable utilization of biodiversity and consumption pattern for climate action
7. To create awareness on the importance of biodiversity and impart knowledge and skills in biodiversity conservation and sustainable use principles and practices.
8. To provide theoretical and practical knowledge on biodiversity and its sustainable utilization.
9. To enable the Programs to feature the internship program in the annual work plans and accordingly put in budget requests.

Conditions of the program

The following conditions have been formulated for the benefit of all parties i.e. the Centre, Academic Institutes and Students involved in the internship program:

- Students intending to apply for an internship at the NBC should send in their application to the Program Director in advance, at least one month prior to the date of joining the internship program. The application should be routed through the college administration for those students whose internship program is included in their academic module. However, for those students applying voluntarily can either apply through their college administration or on their own.

- Academic institutions with internship program in their academic module should clearly communicate the requirements to be met by the NBC before placing the interns.

- The internship program will require a full-time commitment during the period of their internship.

- The minimum duration of internship at the NBC is one month, and the students intending to apply are expected to plan accordingly.

- Interns will be directly supervised by the respective staff under each Program.

- Concerned Academic Institutes will keep in touch with the Centre and monitor the performance/conduct of their intern students

- All interns will have an equal opportunity to work and learn under each Program of the NBC on a rotational basis, and also engage in short field visits planned by the respective programs where feasible.

- Interns wishing to focus only on one particular program during the entire internship period may choose to do so upon informing the intern coordinator of the Centre on the first day of their internship.

- Interns will also have the opportunity to attend workshops and seminars organized by the Centre if it is relevant to their field of study.

- The Centre would also engage the interns in some studies/research works as and when required/wherever possible.

- Interns will be required to follow official summer and winter timings and five days a week routine for the entire internship period, except for the government holidays.

- As the Centre is located quite far from the main town in Thimphu, the interns are expected to arrange their own transportation to and from the office.

- Interns are expected to make a brief presentation at the end of their internship program, describing their learning outcomes, social life at the NBC, feedbacks and recommendations to improve the internship program at the Centre. This is to assess, how meaningfully the Centre managed to engage the interns and also to help the students with their institutional requirements of reporting and presentation on what they learnt.

- Interns will be awarded with a certificate of participation and completion at the end of their internship program.

Expected outcomes

The internship program through a blend of theoretical and hands-on task, offers an opportunity to impart knowledge and skills that will help the interns with their assignments and future endeavors.

- Upon completion of the internship program, the interns should be able to understand how NBC is working towards biodiversity conservation and its sustainable utilization.

- The internship program is expected to impart valuable practical skills, boost self-confidence, develop networks and offer opportunities for them to explore possible career paths so that they can have an advantage in the job market.

The course component and lessons for the interns are described and listed under the respective Programs of the NBC. Following are the Programs under the NBC;

1. Plant Genetic Resources Conservation Program (PGR)
2. Animal Genetic Resources Conservation Program (AnGR)
3. Biodiversity Information Management Program (BIMP)
4. Bio-Prospecting and Access & Benefit Sharing Program (BP & ABS)
5. National Herbarium (NH)
6. Royal Botanical Garden, Serbithang (RBGS)

I. Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture (PGR Program)

Mandates of the PGR Program

1. Assess, document and status reporting of plant genetic resources for food and agriculture.
2. Coordinate and implement on-farm conservation and sustainable use programs of plant genetic resources for food and agriculture.
3. Serve as the national repository for PGRFA germplasm.
4. Develop policies and strategies for effective conservation and sustainable use of PGRFA.
5. Develop protocols linking in situ and ex situ PGRFA conservation programs.
6. Coordinate and implement targeted interventions for prioritized PGRFA.
7. Conduct research and studies on PGRFA diversity to generate required information.
8. Provide germplasm and associated information for breeding and utilization.
9. Promote public awareness on the importance of plant genetic resources for food and agriculture for food and nutrition security.
10. Promote regional and international linkages for technology transfer and effective conservation and management of plant genetic resources for food and agriculture.
11. Serve as the national nodal agency responsible for monitoring, implementing and reporting Global Plan of Action (GPA) for the Plant Genetic Resources for Food and Agriculture under the framework of FAO.

Program objectives

1. To educate students in principles and practices of plant genetic resources management, utilization, and conservation.
2. To promote, maintain and enhance the use of plant genetic

resources for food and agriculture in enhancing sustainable food systems and farming system resilience.

3. To integrate PGRFA conservation and sustainable utilization into the higher education.
4. To promote inclusion of local crop genetic resources into agricultural extension packages and sustainable food systems.

Mode of program

The structured program will be delivered through LR, PR, AS and SS.

LR = Lecture presentation includes direct contact hours through lecture presentations,

PR = Practical includes both laboratory works in processing germplasm and field works in the collection of germplasm.

AS = Assignment, includes non-contact hours to prepare written report for submission and PowerPoint presentation.

SS = Self-study includes reading lecture notes, reading online references, etc

1. General topic: Agrobiodiversity, Options and strategies for conservation

a. Agrobiodiversity
b. The role of agrobiodiversity
c. What is happening to agrobiodiversity?
d. Agrobiodiversity management from a sustainable livelihoods' perspective
e. Plant genetic resources
f. What is a landrace?
g. Importance of plant genetic resources
h. Farmer selection of agro-morphological characters for the next generation
i. Farmer variety names
j. Key factors influencing plant genetic resources diversity
k. Benefits and opportunities from conservation
l. Beneficiaries of conservation
m. Options and Strategies for Plant Conservation

2. In situ conservation

2.1. Inventorying of PGRFA

a. Inventorying of PGRFA
b. Diversity Wheel Analysis
c. Develop pathways for interventions: Prioritization of crops and varieties for possible interventions
d. Documentation of collected information on 'PGRFA inventory'
e. Conduct varietal genetic erosion/build-up assessment

2.2. Enhancing the benefits for farmers from local crop diversity thereby enhancing utilization and ultimately enhancing conservation

a. Introduction
b. Why in situ conservation on-farm?
c. Farmer management of population structure
d. Institutional frameworks for the implementation of on-farm conservation
e. Identification of target crops
f. Define criteria for site selection for on-farm conservation
g. Site selection
h. Diagnostic survey
i. Community sensitization
j. Who are involved in on-farm conservation?
k. On-farm conservation

2.3. Improving the material itself/ developing farmer demanded varieties by participatory crop improvement by Participatory approaches or participatory techniques

a. Participatory Plant Breeding
b. Participatory Variety Selection
c. Evolutionary Plant Breeding

2.4. Identification of climate-smart crop germplasm

a. Climate Analogue tool
b. Identification of climate analogue sites

c. Identification of climate-smart germplasm
d. Farmer resilience and adaptability

2.5. Seed systems and diversity/Strengthening farmers' seed management/I mproving farmers' access to genetic materials

a. Farmers access to crop diversity, seed systems
b. Seed flows
c. Key components of a seed system
d. Informal (traditional) seed supply systems
e. Formal seed supply systems,
f. Community Biodiversity Registers
g. Seed exchange networks
h. Diversity fairs

2.6. Agricultural economics: Increasing the competitiveness of local crop genetic diversity for farmers and increasing consumer demand.

a. Adding value through processing
b. Organic farming
c. Value chains for neglected or underutilized species
d. Marketing of specialty foods

2.7. The sustainable management of community diversity

a. CSB
b. Seed Storage and Quality maintenance in Community Seed Banks
c. Seed Viability Predictions and seed moisture in the community seed banks
d. Diversity Blocks

2.8. Social, cultural and economic factors and crop genetic diversity

a. Social and cultural context
b. Factors influencing farmer variety choice
c. Linking farmer variety choice to on-farm diversity
d. The value of local crop diversity to markets and to farmers

3. Ex-situ conservation

3.1. Ex-situ Conservation Strategies

a. The rationale for ex-situ conservation
b. What can be conserved ex-situ?
c. Strategies for Ex Situ Conservation
d. Minimum requirements for ex-situ conservation

3.2. Types of Ex-situ PGR Conservation

a. Seed and Ultra-Dry Seed Storage
b. Botanic Garden Conservation
c. DNA Storage
d. Field Gene Banks
e. In Vitro Techniques
f. Cryo Bank
g. Pollen Storage
h. Safety Duplicate Gene Bank

3.3. Plant Germplasm Acquisition for Ex Situ Conservation

a. Objectives
b. Criteria for Acquisition
c. Plant Germplasm Acquisition Procedures

3.4. Acquisition through exploration and collection

a. Introduction
b. Planning Collecting Mission
c. Germplasm and passport data collection
d. Taking samples during collection
e. Handling Acquired Materials according to Germplasm Type
f. Care during collection
g. Documenting samples during collection
h. Conditioning and storing samples during collection
i. Post-collection Activities and Seed Processing
j. Seed Processing and Conservation
k. Germplasm characterization and evaluation.

3.5. Procedures after acquisition/Germplasm processing on arrival to the National Genebank

a. Registering samples
b. Seed cleaning
c. Seed drying
d. Seed viability
e. Storage

3.6. Germplasm Documentation

a. Documentation and its Implications
b. Documentation System

3.7. Managing Plant Germplasm Banks

Organizing the germplasm /Types of storage

a. Base collection
b. Active collection
c. Safety duplication/types of safety duplication Germplasm distribution/Duplication for security

4. Ex-situ versus In situ conservation

a. Complementary strategies of ex-situ and in-situ conservation,
b. Relative advantages and disadvantages of ex-situ and in situ conservation

5. Biodiversity policies: International agreements and national policies and laws related to agro-biodiversity

a. Convention on Biological Diversity
b. National Biodiversity Strategies and Action Plans (NBSAP)
c. Access and Benefit Sharing Policy
d. Nagoya Protocol
e. Biodiversity Bill
f. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)
g. The Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture

Remarks: Now the red highlighted themes will feature under BIMS and BP

6. Practical and hands-on-training in the lab and field

a. Germplasm collection from the field
b. Germplasm processing viz, seed cleaning, germination test, seed drying, determination of seed moisture content, quality checking, packaging, labeling, etc. in the gene bank.

7. Assignment

a. Students will have to prepare a written report for submission and a powerpoint presentation.

II. Conservation and Sustainable Use of Animal Genetic Resources (AnGR Program)

Mandates of the AnGR Program

1. Exploration, evaluation and documentation of animal genetic diversity.
2. Promote in-situ conservation of animal genetic resources.
3. Serve as the national repository for animal germplasm (domestic and endangered wild animal species).
4. Provide information on animal genetic diversity in the country.
5. Provide animal germplasm for research and field utilization.
6. Monitor and report on the status of animal genetic resources.
7. Develop strategies and action plans for conservation of animal genetic resources.
8. Promote regional and international linkages for technology transfer for effective conservation and management of animal genetic resources.
9. Serve as the national nodal agency responsible for monitoring, implementing and reporting Global Plan of Action (GPA) for the Plant Genetic Resources for Food and Agriculture under the framework of FAO.

Program objectives

1. To educate students in principles and practices of animal genetic resources management, utilization, and conservation.
2. To promote, maintain and enhance the use of animal genetic resources for food and agriculture in enhancing sustainable food systems and farming system resilience.
3. To mainstream Animal Genetic Resources into the higher education.
4. To incorporate/mainstream local animal genetic resources into farming extension packages and sustainable food systems.

Detailed Activities to be undertaken during the internship

1. Understanding AnGR Program

a. Give the interns enough material and direct them related website (CGRFA< FAO-ANGR)
b. Learn about CGRFA/ AnGR in the context to Bhutan

Expected outcomes:

- Enhanced understanding of AnGR
- Enhanced understanding implementation of AnGR policies in Bhutan.

2. Hands-on training on Laboratory Management

a. Learn about the collection, processing and cryopreservation of different animal germplasm.
b. Learn about the different aspects and functioning of the molecular lab (Basic skill training on Biological sample collections, DNA extraction and sample processing)

Expected Outcomes:

- Enhanced understanding about the functioning of the Animal Gene-Bank and the molecular lab
- Built Capacity on the basic functioning and management of the laboratories.

3. Field activities: On Need Basis

a. Involve in awareness-raising programs
b. Involve in other field collections
c. Expected days, subjected to the activity.

Expected outcome:

- Enhanced understanding of different field activities carried out by the program.

III. Biodiversity Information Management (BIM Program)

Mandates of the BIM Program

1. Serve as the national clearing house for biodiversity information and as a national node for global and regional biodiversity information sharing mechanisms.
2. Coordinate, collate and disseminate biodiversity information through the national biodiversity portal to enable development of effective biodiversity conservation and sustainable use plans of biological resources.
3. Coordinate implementation and status reporting of obligations under regional and international conventions/treaties/protocols.
4. Coordinate the formulation of cross-cutting national action plans and status reports, including Centre's developmental plans and progress reports.
5. Coordinate formulation and implementation of policies and legal framework related to biodiversity.
6. Coordinate/lead programs promoting awareness and participation in biodiversity conservation and sustainable use
7. Coordinate and facilitate development of databases, publications and information products, including exploration of relevant ICT technology for adoption in biodiversity data management and provision of ICT services of the centre.
8. Coordinate inventory and documentation of biodiversity with data/information gaps.
9. Serve as the national reference centre for biodiversity related publications.
10. Promote linkages with regional and international biodiversity information centres for effective information management.

Detailed Activities to be undertaken during the internship

If managed well, interns can be a fantastic resource to the National Biodiversity Centre (NBC). They can help us with those tasks which we have been meaning to do but can never quite find time. They can

provide fresh insights including a youth perspective and innovative ideas. Similarly, a well-managed and guided internship at BIMP has a lot to offer to interns in terms of exposure to a functioning workplace and potential career opportunities, the chance to learn new skills and the chance to learn about resources available to them both for their study and future career.

1. Bhutan Biodiversity Portal

a. Familiarization to the portal.
b. Work on creation of species page for mammals or plants according to gap analysis.
c. Assist in bringing in innovative ideas for wider outreach and making portal user friendly.
d. Develop posters for Bhutan Biodiversity Portal.
e. Participate in the field trips for awareness programs, and specimens and data collections.
f. Assist in data management and analysis.

Expected outcomes:

- Creation species pages for Bhutan Biodiversity Portal.
- Come up with any innovative plans for portal outreach.
- Develop two posters for Bhutan Biodiversity Portal.

2. Biodiversity Statistics of Bhutan

a. Sort out data for different taxonomic groups.
b. Check spelling errors and validate species existing with EoL, CoL, IUCN and GBIF.
c. Check latest updates on biodiversity discoveries (new species and records) of Bhutan.

Expected outcomes:

- Complete sorting of data.
- Complete error corrections.
- Updated checklist for latest biodiversity discoveries and records.

3. Identification (flora)

a. Learn identification techniques for flora using Flora of Bhutan.
b. Try to identify common species in the portal.

Expected Outcomes:

- Identify few floral observations in the portal.

4. Invertebrates Repository

a. Learn to manage specimens.
b. Learn to collect and identify specimens (e.g. molluscs).
c. Compile national and regional papers, reports and documents on invertebrates of Bhutan.

Expected Outcomes:

- Learn identification techniques of invertebrates.
- Collate information on invertebrates in Bhutan.

5. Awareness creation and field works

a. Assist in organizing awareness workshops, seminars, campaigns and BioBlitz.
b. Assist in any other field works assigned by the supervisor.

Expected Outcomes:

- Learn to organize workshops or to create awareness on biodiversity conservation through biodiversity informatics and inventory.

IV. Bio-prospecting and Access & Benefit Sharing (BP & ABS Program)

Mandates of the BP & ABS Program

1. Implementation of National Access and Benefit Sharing Policy and Legislations.
2. Document, protect and appropriately utilize TK associated with biological resources.
3. Conduct exploration and research on biological resources of the country for natural product development and bio-discovery.
4. Promote innovative measures to encourage people's leadership and participation in conservation (e.g Bhutan ABS Fund, Community natural resource management initiatives, etc).
5. Provide technical inputs for developing policies and protocols on conservation and sustainable use of biological resources and associated TK.
6. Provide technical input for the execution of contract agreements, MTA, awareness raising programs, etc.
7. Promote regional and international linkages for collaborative work in the field of bioprospecting and access and benefit sharing.

Objective

The main objective of the program guideline is to guide the interns at the Bio-prospecting and ABS program and engage them efficiently so that their time at the program is enriching professionally and personally.

Detailed Activities to be undertaken during the internship are:

1. Understanding CBD & ABS

a. Give them enough material and direct them to CBD and ABS related website
b. Learn about CBD and ABS in the context to Bhutan

Expected outcomes:

- Enhanced understanding of CBD and ABS policies.
- Enhanced understanding implementation of ABS regime in Bhutan.

2. Understanding Traditional Knowledge associated with biological resources

a. Learn about different forms of Traditional Knowledge associated with biological resources and their importance in the context of ABS and intellectual property.
b. Learn about Traditional knowledge guided biodiscovery research in Bhutan.
c. Learn about the process of inventory and documentation of traditional knowledge including prior informed consent and mutually agreed terms.
d. Sample collections and the making of Medicinal Herbarium and its importance.

Expected outcomes:

- Enhanced understanding of the importance of traditional knowledge.
- Capacity built on the process involved in the preparation of herbarium.

3. Understanding Biodiscovery research

a. Learn about the Bioprospecting Laboratory and different equipment at the laboratory.
b. Learn about the different methods and ways of biodiscovery research.

Expected outcomes:

- Enhanced understanding of biodiscovery research and different methods and processes involved.

4. Hands-on training on Laboratory Management

a. Learn about different SOPs implemented at the Bioprospecting laboratory.
b. Learn about the different processes involved in the collection of plants for biodiscovery research.
c. Carry out basic biodiscovery research such as the operation of equipment involved in the processing and extraction of crude extracts for biodiscovery research.

Expected Outcomes:

- Enhanced understanding of various SOPs implemented at the Bioprospecting laboratory.
- Capacity built to carry out basic biodiscovery research such as the operation of equipment involved in the processing and extraction of crude extracts for biodiscovery research.

5. Hands-on training on basic phytochemical analysis

a. Understanding and researching about different methods of analyzing crude extracts.
b. Understanding the workings and principles of HPLC.
c. Learn about the preparation of samples for HPLC.
d. Demonstration of HPLC.

Expected outcomes:

- Enhanced understanding of various methods incorporated for analyzing crude extracts
- Enhanced understanding of the operation of HPLC.

6. Hands-on training on different types of Distillation

a. Learn about the different processes and types of distillation methods.
b. Learn about the operation of the two distillation machines at the program.
c. Learn about the collection, processing and distillation of the medicinal and aromatic plants

Expected Outcomes:

- Enhanced understanding of the different types of distillation methods.
- Capacity built on the processing and extraction of essential oil using different distillation methods.

7. Hands-on training on the cold and hot press method of extraction of fixed oil

a. Learn about the different processes and types of extraction methods.
b. Learn about the operation of the two oil expeller machines at the program.
c. Learn about the collection, processing and distillation of the fixed oil yielding plants.

Expected Outcomes:

- Enhanced understanding about the different types of oil extraction methods.
- Capacity built on the processing and extraction of fixed oil using cold and hot press methods.

8. Hands-on training on the Basic product development

a. Understanding, demonstration and hands on experiment on the Zhinor balm production.
b. Understanding, demonstration and hands on experiment on soap making using essential oil produced by the distillation performed.
c. Understanding, demonstration and hands-on experiment on lip balms with the oil they produced.
d. Understanding, demonstration and hands-on experiments in making other products from the raw materials available.

Expected outcome:

- Enhanced understanding of the potential of Bhutan's biodiversity on natural product development.

- Capacity built on basic understanding and knowledge in natural product development.

9. Field activities: On Need Basis.

a. Involve in awareness-raising programs.
b. Involve in other Bio-exploration activities.
c. Involve in the collection of plant materials.
d. Field trips to MSPL, BioBhutan and other agencies related to Natural products.

Expected outcome:

- Enhanced understanding of different field activities carried out by the program.
- Rendered a helping hand to the BP & ABS programs.

V. Botanical Specimen Preservation and Collection Management (National Herbarium)

Mandates of the National Herbarium

1. Serve as the national botanical repository and reference Centre.
2. Strengthen botanical information and knowledge base through exploration, collection and documentation of floristic diversity in the country and digitization of the collections.
3. Provide plant taxonomic facilities, training and services for species determinations.
4. Manage and monitor herbarium collections and database.
5. Coordinate plant taxonomy and botanical research and identify conservation priority species in the country.
6. Coordinate development of conservation strategies for prioritized plant species.
7. Develop and implement protocol for deposition of duplicate specimens of national botanical works.
8. Establish and manage bio-cultural and ancillary collections.
9. Facilitate specimen loaning, exchange, gift, etc of herbarium specimens as per the established protocol.
10. Promote awareness and education on invasive plant species and their impacts.
11. Promote regional and international linkages for collaborative work in the field of botany and taxonomy.

Details of the Internship Program

The Internship Program is designed to allow students of botany, environmental science and related subjects the opportunity for substantive scientific work experience at the National Herbarium in botanical diversity documentation, and systematics research.

The students will assist with various program activities and receive both task-specific training and general botanical training, particularly on

herbarium techniques. Work sessions are designed to give the students a feel for life in the scientific workforce. Training sessions complement academic studies with both botanical and general workforce-skills components.

The students will work at the National Herbarium located at the National Biodiversity Centre (NBC) in Serbithang and will receive a broad spectrum of practical botanical hands-on experience guided by a team of experienced officials of the National Herbarium.

Learning objectives

1. Best practices for plant specimen collection and preparation.
2. Preservation of plant specimens.
3. Herbarium collections management procedures.
4. Basic plant identification, classification, and taxonomy of Bhutanese flora.
5. Introduction to Bhutan Biodiversity Specimen portal as collection database.

Internship Curriculum

General internship topics will partially overlap with the routine assistance that the interns will give to staff in the areas of collection, preparation, curation and management. The interns will not become expert in any one topic, but in fact will become acquainted with most or all of them in a practical and job-oriented way.

Components of the internship program: It includes both theory and practical lessons.

1. Introduction

a. An introduction to the herbarium.
b. Functions of herbarium.

c. Different types of herbaria.
d. Specialized collections within herbarium.
e. Different types of herbarium collections.

2. Collecting plants

a. Collectors.
b. Types of collecting.
c. Collecting equipment.
d. Dealing with collected plants in the field.
e. Recording information.

3. Identifying specimens

a. Referring the Flora of Bhutan.

4. Pressing and drying

a. Plant press and its components.
b. Standard pressing methods.
c. Special pressing methods.
d. Drying specimens.

5. Mounting specimens

a. Materials and equipment.
b. Mounting procedures.
c. Envelopes.
d. Gluing.
e. Strapping.
f. Stitching.
g. Labelling.

6. Physical curation

a. Storing specimens.
b. Species covers.
c. Genus covers.
d. Type covers.
e. Systematic arrangement.
f. Indexes and cupboard lists.

7. Herbarium data administration

a. Introduction to herbarium database.
b. Data input.
c. Data cleaning.

8. Pest management

a. Preventing insect damage.
b. Temperature and humidity control.
c. Monitoring.

9. Others

a. Repair and maintenance of herbarium specimens.
b. Loaning and exchange of specimens.

Expected Program Outcomes

The Program endeavours to impart, through a combination of theoretical and practical work, a range of knowledge and skills that will benefit the interns in their future employment. At the end of the internship program, the students are expected to have a clear picture of what the national herbarium is doing and how things are done. The internship program is expected to provide the students with valuable work experience, gain confidence and provide opportunity for them to explore career path with an edge in the job market.

VI. Botanical Garden Development and Management (Royal Botanical Garden, Serbithang)

Mandates of the Royal Botanical Garden

1. Serve as the living repository of plant genetic diversity for ex situ conservation and research.
2. Serve as a rescue center for rare and threatened native floral species (prioritized native floral species).
3. Promote propagation of prioritized native plants species to reduce pressures on collection from the wild and to ensure their sustainable use.
4. Implement mass propagation of prioritized native flora for restorations programs and commercialization to encourage house hold cultivation and conservation.
5. Provide technical services and training in plant propagation techniques to community-based groups and other interested stakeholders.
6. Provide technical service in community beautification and greening projects.
7. Implement targeted biodiversity education programs.
8. Participate in floral diversity documentation programs.

The main objectives of the internship program at the Royal Botanical Garden are:

1. To engage the students in nature conservation and awareness programs.
2. To obtain hands on training on the basics of plant propagation and nursery management.

Activities

1. Plant propagation and nursery management.

a. Learn basics of plant propagation.
b. Hands on training on different types of propagation methods.
c. Learn basics of plant nursery management.
d. Hands on training on nursery management.
e. Learn basics of landscaping and beautification activities
f. Hands on training on landscaping and beautification activities.
g. Assist in tissue culture laboratory for micro-propagation of orchids.

Expected outcomes:

- Know the basics of plant propagation methods and plant nursery management.
- Propagate plants with different methods and care for the plants during their stay.
- Beautification of the garden.

2. Environmental education.

a. Learn how to guide visitors and students at the garden on the nature and flora of the garden.
b. Learn how to guide visitors at the Biodiversity Interpretation Centre.

Expected outcomes:

- Be able to guide visitors of the garden.
- Be able to guide visitors at the Interpretation Centre.
- Share innovative nature guiding techniques.

3. Identification (flora)

a. Learn plant identification techniques using Flora of Bhutan.
b. Try to identify common species at the garden.
c. Participate in the field trips for live plant, seeds, specimens and data collections.
d. Assist in data management and analysis.

Expected Outcomes:

- Identify living collections at the garden.
- Make herbarium specimens and identify them.

4. Orchidarium management

a. Learn to manage orchid collections.
b. Learn to collect and identify orchid species.
c. Compile national and regional papers, reports and documents on orchids of Bhutan.

Expected Outcomes:

- Learn identification techniques of orchids.
- Collate information on orchids in Bhutan.

Note: Plant propagation and nursery management notes will be handed out to the students.