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FOREST AND NATURE CONSERVATION CODE OF BEST MANAGEMENT PRACTICES OF BHUTAN

VOLUME VI: RESEARCH AND DEVELOPMENT



Department of Forests and Park Services

DEDICATION

A tribute to our Benevolent Druk Gyalpo, His Majesty Jigme Khesar Namgyel Wangchuck, for His Selfless Service and Leadership to the People and Country





MINISTER

མོ་ནམ་དང་ནགས་ཚལ་ལྷན་ཁག།
ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture and Forests
Tashichhodzong
Thimphu: Bhutan



MESSAGE



I applaud the Department of Forest and Park Services for coming up with the Forest and Nature Conservation Code of Best Practices of Bhutan which is an updated version of the erstwhile Forest Management Code of Bhutan, 2004. The erstwhile code only covered sustainable management of Forest Management Units. However, with the shift of forest management paradigm to include other important aspects such as climate change, wetland and watershed management, biodiversity conservation & monitoring, agroforestry, payment for ecosystem services etc., a more comprehensive guideline has become imperative. The revised *Code* broadens the scope of applicability covering wide range of contemporary forestry practices providing detailed guidelines on the technical aspects of forest resources management and biodiversity conservation.

The revision of the *Code* is timely and will play a significant role towards sustainable management of our forest resources especially in light of the global climate change and its anticipated impacts on our fragile mountain ecosystems. The *Code* will also take into account the application of advanced technologies in forest management and biodiversity conservation and will provide strong emphasis on monitoring and evaluation of forest and forestry programs which has always been our weakness.

The revised *Code* will also become handy to our colleagues in the field as it will serve as the single source of scientific guideline for all forestry management regimes in the country.

With the publication of this *Code*, Bhutan joins many countries who manage their forest through such technical guidelines. Our country now establishes a robust technical guideline for management of all forest resources in the country and I am confident that it will fulfill our aspiration of bringing all forest resources under sustainable management fulfilling the objectives of our National Forest Policy and the Constitutional mandate of maintaining 60% of forest cover all times to come.

I would like to commend the efforts and hard work of our colleagues in the Department of Forest and Park Services, particularly those who were involved in the revision of this *Code* and I hope this code will be useful to wide range of stakeholders outside of the Department as well.

Tashi Delek!

Yeshe Penjor



SECRETARY

མོན་མ་དང་ནགས་ཚལ་ལྷན་ཁག།
ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture and Forests
Tashichhodzong
Thimphu: Bhutan



MESSAGE



I commend the Department of Forest and Park Services in bringing out the revised Forest and Nature Conservation Code of Best Practices of Bhutan which presents a comprehensive technical guideline for sustainable management of forest resources and biodiversity conservation in the country.

The intricate combination of several programs and activities on sustainable forest management and biodiversity conservation is fundamental to sustainable development, from their vital role as climate regulator, carbon sequestration and the vital ecosystem services they provide. Sustainable management of these forest resources are therefore essential if these benefits for the environment and societies are to be maintained for future generations. Such long-term feats can be achieved only if we are able to manage the huge forest base resources holistically.

Such holistic achievement can only be possible through a science based technical guideline - the *Code*. Its implementation will also ensure that the forests in Bhutan are managed through the integration of good science, research, technology and decades of forest management experiences.

The code also provides consistent and transparent approach to planning and implementation of sustainable forest management plans, conservation plans and activities at all levels and across all other cross-cutting management regimes. The *Code* now provides the deep nexus in making appropriate science-based decisions on several forestry and conservation issues.

I would like to congratulate the Department and in particular the technical working group members for coming up with this code which is a milestone in our effort towards sustainable forest management and biodiversity conservation.

I urge all relevant stakeholders, government and non-government, besides the colleagues of the Department of Forest and Park Services to actively use and implement the Code in managing our forest resources for the benefit of present and future generations.

Tashi Delek!

A blue ink signature of Rinzin Dorji.

Rinzin Dorji



DIRECTOR

དཔལ་ལྷན་འབྲུག་གཞི་རིག་པའི་སྐོར་དང་ནགས་ཚལ་སྤྱོད་ལག་ ནགས་ཚལ་དང་སྤྱོད་ལག་ཞབས་ཏོག་ལས་ཁུངས་

ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture and Forests
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Thimphu: Bhutan



FOREWORD



Forests have always played a key role in the livelihood of Bhutanese and is intrinsically intertwined with the social, culture and tradition of our country. In view of its pivotal role not only on socio economic development but also on climate regulatory function through several means and vital ecosystem services, sustainable forest resources management has always played a key role in sustaining our natural forest resources. Bhutan is one of the few countries in the world that enshrines forest and environmental conservation aspects in its Constitution. Article 5 of the Constitution of the Kingdom of

Bhutan reflects commitment to ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time. Bhutan also committed to remain carbon neutral at the 15th Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2009 in Copenhagen, Denmark. In addition, the Intended Nationally Determined Contribution (INDC) submitted in September 2015 towards finalization of Paris Agreement further re-iterated Bhutan's pledge to remain carbon neutral. Today with over 71% of the total land of Bhutan under forest cover (2,717,161 ha), forests form an important and indispensable national asset sequestering around 8.5 million tonnes of carbon,, generating continuous water flow to sustain our hydro power systems, providing timber and firewood resources to Bhutanese citizens etc.. Out of the total forest area (2,717,161 ha) about 33.29% (904,423.78 ha) fall within the Protected Area Systems (National Parks, Wildlife Sanctuaries and Strict Nature Reserve) and about 19.96% (542,346.32 ha) is managed as Forest Management Units, Community Forests and Local Forest Management Areas.

Therefore, in order to fulfill our international commitment to remain carbon neutral and constitutional mandate of maintaining 60% forest cover for all times to come besides harnessing other benefits such as social, cultural, economic and ecosystem services, it is imperative that the Department possesses a *Code* outlining science based management of the overall forests and biodiversity resources which will enhance the productive and ecological functions of our forest ecosystems. This *Code* has been developed through integration of good science, research, technology and decades of forest management experiences. It gives me a great pleasure in congratulating the entire Technical Working Group involved in the preparation of this *Code*. This *Code* will definitely strengthen the sustainable forest resources management and biodiversity conservation practices in Bhutan for eons to benefit the present and future generations.

Tashi Delek!

Lobzang Dorji

INTRODUCTION

Volume VI of the Forest and Nature Conservation Code of Best Management Practices of Bhutan (hereafter referred to as the *Code*) provides guiding principle of forestry research and development in Bhutan. The study of forests, which also includes their restoration, conservation and sustainable use, encompasses a broad suite of scientific disciplines, and, research in this field is becoming increasingly interdisciplinary.

Research has and shall continue to contribute to improve forest management and productivity, conserve biodiversity, maintain ecological integrity and provide ecosystem services. Research, development of technology and application of new tools must be the basis of sustaining, restoring and enhancing the tangible and intangible benefits which are derived from the forest. This volume of the *Code* encompasses the following two chapters which are necessary to understand the performance of all the programs instituted under all other volumes of the *Code*.

1. Forest Biodiversity and Ecosystem Research (FoBER)
2. Mainstreaming Research Findings into Forest and Biodiversity Policies, Plans and Programs

Research and its findings are the cornerstone for the sustainable management of forests and are highlighted under different Volumes of the *Code*. Research outcomes shall identify the next step essential under all the volumes as a progression and also recommend appropriate actions to the unsound practices. A sound research can ensure well-informed policy development with implications for livelihood for those living in and around the forests. Guiding documents in the form of management plans, strategies and frameworks are revised based on the empirical evidence generated from the research for effective and sustainable management of forests and wildlife.

ACRONYMS

CBD	Convention on Biological Diversity
CDR	Central Data Repository
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DoFPS	Department of Forests and Park Services
FoBER	Forest Biodiversity and Ecosystem Research
FMCB	Forest Management Code of Bhutan
FNCRR	Forest and Nature Conservation Rules and Regulations
FYP	Five Year Plan
MoAF	Ministry of Agriculture and Forests
PI	Principal Investigator
RCM	Research Coordination Meeting
RSC	Research Steering Committee
SRF	State Reserve Forest
TAC	Technical Advisory Committee
UWICER	Ugyen Wangchuck Institute for Conservation and Environment Research

DEFINITION

Species new to science refers to a species, sub-species or variety of plant or an animal that is uniquely distinct from any other species, sub-species or variety and has not been previously described.

New species record refers to species that have been already been described and recorded in other place/habitat but has been found for the first time in a new place/habitat.

Principal Investigator refers to the primary individual responsible for the preparation, conduct, and administration of a research grant, cooperative agreement, training or public service project, contract, or other sponsored project in compliance with applicable laws and regulations and institutional policy governing the conduct of sponsored research.

Qualitative data refers to photograph, audio, video and data generated from semi-structured questionnaires based research.

Quantitative data refers to any numeric and/or geospatial data sets.

Research Coordination Meeting refers to a periodic meeting organised by the UWICER to bring together the officials from the Department to identify priority research areas, funding sources, principal investigator and collaborators to conduct research.

Research Steering Committee refers to a group of experts formed as per the approval of the Department to approve the research proposals at the Department.

Technical Advisory Committee refers to the highest decision-making body within the Department, comprised of Chiefs and Specialists of various divisions which shall formulate guidelines, advice the Department on technical matters whenever required.

Taxa Specialist Committee refers to a group comprising of experts (botanist, zoologist, biologist, etc.) who shall validate the discovery of new species for Bhutan and species new-to-science using technical knowledge and experiences.

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1. Forest Biodiversity and Ecosystem Research (FoBER)

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1. Forest Biodiversity and Ecosystem Research (FoBER)

1.1. Background

This chapter outlines the working modalities and procedures in the conduct of forestry and biodiversity-related research in Bhutan. The Forest Biodiversity and Ecosystem Research (FoBER) shall guide to generate cutting-edge technologies and empirical knowledge for achieving sustainable forest management and conservation in the country. The objectives of sustainable forest management, conservation of biodiversity, adaptation to climate change and integrated watershed management shall guide the planning and implementation of FoBER (MoAF, 2011). The research needs and priorities of the Department shall be identified through Research Coordination Meeting (RCM) and research review meetings.

The Ugyen Wangchuck Institute for Conservation and Environment Research (UWICER) shall lead all forms of research in forests and conservation which shall contribute to the national goal of sustainable forest management and conservation of forest resources in a more climate smart manner. Research shall be carried out in close collaboration with relevant stakeholders but not limited to, functional divisions and field offices within the Department. The research shall provide and recommend innovative solutions to overcome emerging problems related to forest biodiversity, ecosystem conservation and overall forest management in Bhutan. The successful conduct of research shall require investment both in terms of human resource development and financial resources.

1.2. Scope and Scale

The scope of FoBER shall be dynamic and subject to periodic review and update. It shall uphold the principles laid down under Article V of the Constitution of the Kingdom of Bhutan and related acts and policies. The scale of the research shall be within the State Reserved Forest (SRF) land and any other land use as specified under the Forest and Nature Conservation Rules and Regulations of Bhutan (FNCRR, 2017) or any other revision hereafter.

The research activities shall be broadly classified under the following domains (Figure 1.1).

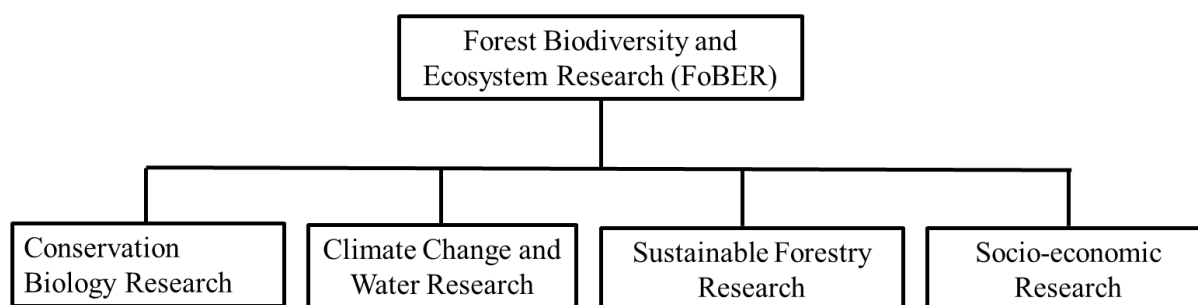


Figure 1.1 Forest Research Domains

All research domains should dovetail with the research priorities of the Department and other clients in the country and shall aim to promote science-based management of natural resources. The *Code* shall uphold the country's commitments to national, regional and international conventions and agreements.

1.3. Roles and Responsibilities

UWICER, as the research wing of the Department, shall cater to the research needs of the Department. The roles and responsibilities of various offices under the Department are detailed in Table 1.1.

Table 1.1 Roles and Responsibilities

Offices	Roles and responsibilities
UWICER	<ul style="list-style-type: none"> • Spearhead all research activities in the country • Plan and coordinate RCM, seminars, workshops, conferences and trainings • Serve as the research clearing house. • Review research proposals and issue research clearance to the proposals which are not endorsed by the RCM • Function as a central data repository of the Department • Facilitate data sharing from the central data repository • Disseminate research findings • Review of new species discovery and the new species record
Other Functional Divisions	<ul style="list-style-type: none"> • Prioritize research topics and present to the RCM • Submit data to the central data repository • Serve as member for Technical Advisory Committee (TAC)
Field Offices	<ul style="list-style-type: none"> • Present prioritized research topics at RCM • Approve proposals for research sites within their jurisdiction • Lead or collaborate research with UWICER • Submit data to the central data repository
TAC	<ul style="list-style-type: none"> • Review and approve proposals which are not approved by the UWICER Research Steering Committee (URSC).

1.4. Research Planning and Prioritization

Research planning and prioritisation is done to optimise the use of limited available resources and align to the sectoral Five Year Plan (FYP) goals. Planning shall ensure timely implementation and resource sharing for quality research output. Prioritization of research shall seek to identify critical research areas of the Department. The steps in Figure 1.2 shall be followed to conduct research.

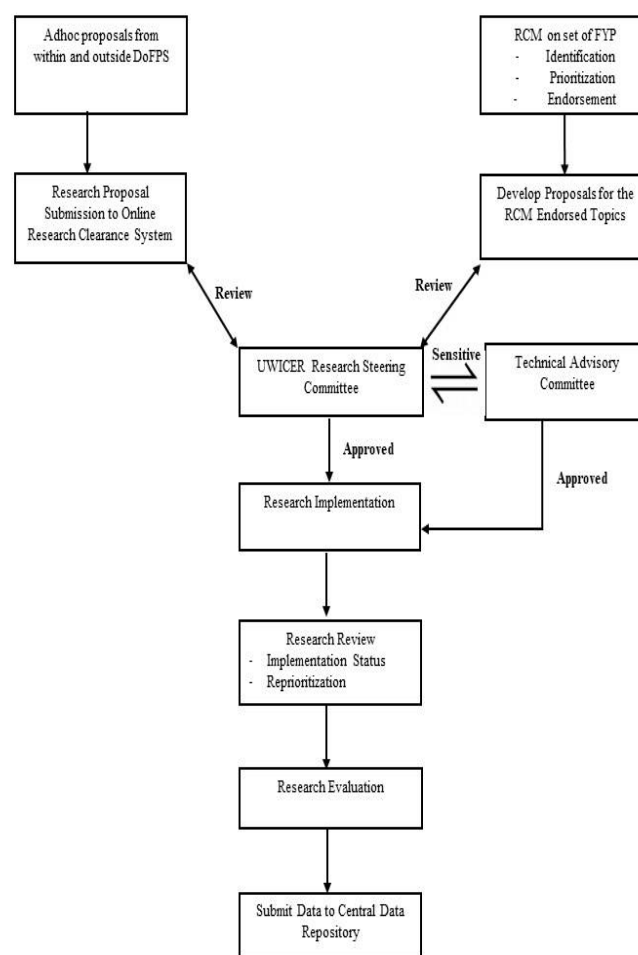


Figure 1.2 Research Planning, Prioritization and Implementation

1.4.1. Research Prioritization and Planning

The research plan should align with the Department’s FYP and any other relevant management plans such as biodiversity action plan, forest resources management plan, conservation management plans and species action plan, amongst others. UWICER shall coordinate RCM annually and bring together functional divisions, field offices, and other relevant stakeholders to prioritise the research needs of the Department. RCM shall also act as one of the forum to disseminate research findings for incorporation into policy decision, management planning, and guide future research.

During RCM, the field offices shall present their critical research needs for prioritisation and endorsement. The meeting shall identify lead implementer (UWICER) and collaborating agency, including funding source, scope (nationwide or area-specific), and expected outcomes.

The principal investigator (PI) shall develop a research proposal for the endorsed research, submit to the UWICER for review to ensure that appropriate research design and data analytical methods are incorporated in the research proposals.

1.4.2. Screening and Approval for Research Clearance

As per Section 166, Chapter IV of FNCRR, 2017, any individual or organization intending to conduct research in the State Reserve Forest Land (SRFL) or other forests of Bhutan shall apply to UWICER for research clearance. UWICER shall form URSC and issue research clearance.

The URSC at UWICER shall screen and approve adhoc research proposals apart from those endorsed at RCM. URSC shall comprise of Head, UWICER; Heads of Centre under UWICER, CFOs of study sites and subject experts. Research proposals shall be submitted in the prescribed format (Table 1.2) through the online research clearance application form (Table 1.3) at <http://www.uwice.gov.bt/rcs/>. URSC shall review the proposals based on the clarity of objectives, methods, research duplication, ethical issues and occupational health and safety. The URSC shall notify on the decision of the proposal within 14 days.

Research proposals involving threatened species and those listed in the schedule I of FNCRR 2017 or any amendments made hereafter shall not be cleared by URSC and shall be referred to TAC for further decisions.

Table 1.2 Research proposal format

- Title
- Principal investigator [Name, Agency and Qualification]
- Collaborator [Name and Agency]
- Funding source [Mention secured or not secured]
 - Secured [Name of the funding agency]
 - Not secured [Mention the grant applied for]
- Rationale [explain why you decided to undertake this work] – Limit to 1000 words
- Study site [provide brief description of your study sites, including habitat and conservation importance and why it was chosen] – Limit to 300 words
- Work plan [Describe the key activities and when it would be undertaken] – tabular format**
- Methods [Describe the research methods in detail. Also explain why it was chosen] – Limit to 1000 words
- Ethical issues (If any) [In case of handling of wildlife /plant specimens are involved]
 - Yes
 - Animals
 - Collaring /GPS tagging/ Tissue samples/Trapping
 - Specimen collection
 - Plants
 - Specimen collection
 - Interviews
 - No
- Expected output of the study [Limit to 300 words]

Table 1.3 Research Clearance Application Form

Apply for Research Clearance

Please fill the following fields to apply for research clearance.

Name

Contact no.

Email

Are you a Student/Govt. employee or working for NGO/CSO/Private agency?

Details of the Research

Theme

Select Theme

Title

Objectives (Rationale)

Total word count: 0 words. Words left: 50

Methods (Methodology)

Total word count: 0 words. Words left: 200

Start Date

End Date

Name of Research Site

Select Research Site (Please select a point of your research area on the map below)



Upload proposal (PDF only)

Choose File no file selected

* The current date will be set as the research application date and it is system generated.

☐ I hereby acknowledge that I have read and understood the terms and conditions of the Research Clearance System and agree to all of them. I also agree to share any publications [pamphlets, books, journal articles, reports, guide books, manuals, web-articles, policy briefs, etc.] that comes out of the study together with data to UWICER. UWICER in return shall archive the submitted data and publications for future reference and UWICER shall not share or use the shared data without the written consent of the researcher. In-case the I fail to conduct the planned activity, I will notify UWICER so that approval is not hindered should similar proposal be submitted in the future.

SUBMIT

RESET

1.5. Research Steps

Research is a systematic investigation into and study of materials and sources in order to establish facts or arrive at new conclusions.

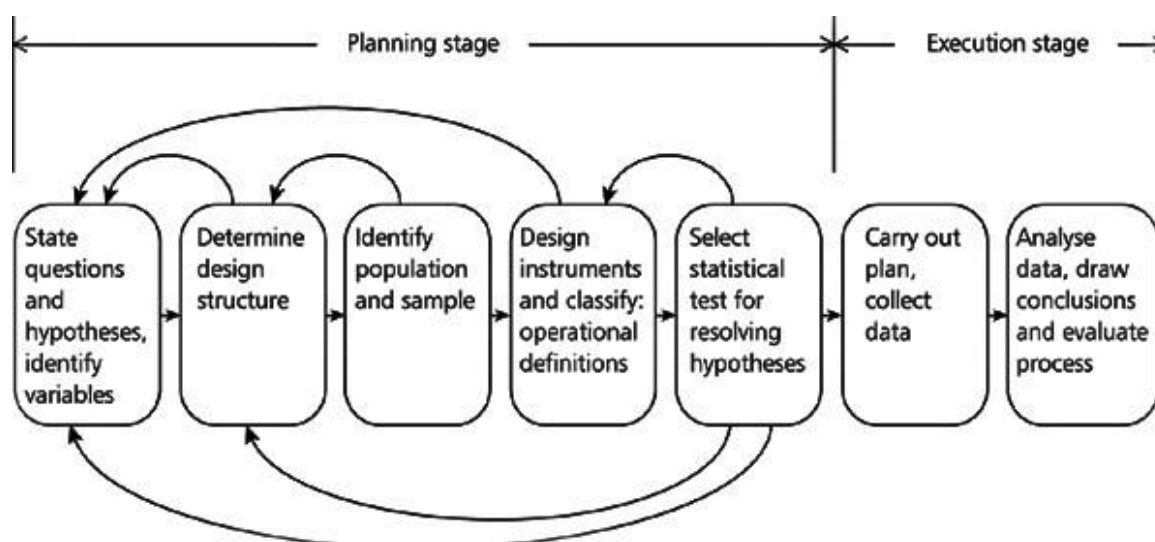


Figure 1.3 A Sample Research Design (Black, 1999)

The following procedures should be followed for conducting research:

1. State questions and hypotheses, identify variables

The first step begins with framing a research question such as, “*Are there enough food for Tigers in the forest?*” Then, the researchers need to state hypothesis pertaining to that research question. Hypothesis shall provide response to the research question stated such as, “*There is abundance of food for Tigers in the forest*” or the response could be negative, “*There is not enough food for Tigers in the forest*”. After hypothesizing, researchers need to identify factors that could influence the hypothesis such as, human population, prey base, other predators, etc.

2. Determine design structure

In the second step, researchers need to design an appropriate research structure to devise an elaborate plan of activities to get correct responses for the research question.

3. Identify population and sample

The next step is to identify population and sample for the study. Population is a complete set of elements (persons or objects) that possess some common characteristic defined by the sampling criteria established by the researcher. It can be either an entire group of people or objects to which the researcher wishes to generalize the study findings such as the regional population of Tigers and preybase density.

Sample is the process of identifying individual variables or factors that influence the research question such as human population, which could influence food availability for the Tigers.

4. Design instruments and classify: operational definitions

Choice of tools and equipment to carry out fieldwork is the next step and should be done vis-a-vis research design.

5. Select statistical test for resolving hypotheses

There are many statistical tests to validate hypotheses. Choosing one or more statistical tests to validate the hypothesis is one of the most crucial steps. Statistical test such as t-test and f-test may be used to validate the hypotheses.

6. Carry out plan and collect data

After the plan has been prepared, researchers need to carry out fieldwork and collect data. Data collection constitutes major component of any research.

7. Analyse data, draw conclusions and evaluate process

After data collection, the data needs to be segregated and stored in proper order. Then, using appropriate method, the data needs to be analysed and interpreted. Once the data is analysed, researchers need to discuss results and draw conclusion.

The conclusion must include recommendations to be mainstreamed in the strategies, plan and programs of the Department.

1.6. Institutional Linkages

Research shall require collaborations among institutions, independent researchers and other stakeholders for effective delivery of results, optimal use of resources, sharing of expertise and infrastructure, laboratory facilities, avoiding research duplication, transfer of technology and human resource development (Mcginley, Guldin and Cabbage, 2019).

1.6.1. National Linkages

UWICER shall collaborate with other offices under the Department for planning and implementing research activities. The Department shall also work with outside agencies to ensure effective coordination among implementers in the execution of research plans and programs in the country.

Within the Department, all the functional divisions and field offices shall attend the RCM and contribute to drawing of research plans and priorities of the Department.

1.6.2. International Linkages

When there is a lack of relevant expertise in the country, UWICER shall seek for international experts to conduct collaborative research, build local capacity, broaden outreach, transfer technology and promote networking.

UWICER shall liaise with relevant international institutions upon the approval from the Government (Memorandum of Understanding, Letter of Intent and Agreements).

1.7. Central Data Repository

A data repository is a place that holds qualitative and quantitative data sets for secondary use in research and organizes data in a logical manner. Any data generated in the country shall be recognized as the national wealth; thus research data shall be archived and managed in the Central Data Repository (CDR). The researcher shall deposit research data to the CDR maintained with UWICER.

1.7.1. *Modus operandi* of Central Data Repository

The CDR at UWICER shall have two main components:

1. Data storage server
2. Data portal

1.7.1.1. Data Storage Server

This server shall be hosted at UWICER and shall store all the data. The Department and the concerned data owners shall give access to primary data upon authorization.

1.7.1.2. Data Portal

This portal is a User Interface, which shall be accessible to all the users. On the interface, a table containing metadata of the researches done till date shall be available to facilitate access to primary data. Metadata shall contain research date, research title, objective, site, researcher, agency, email address and contact details of the data owners.

In the portal, the researcher can upload their data. In addition, it shall also provide weblinks to other relevant data repositories such as Forest Information Reporting and Monitoring System (FIRMS).

1.7.2. Data Ownership

The ownership rights of data within the CDR shall lie with the Department, the research funding agencies (as per the terms and conditions), and the concerned researchers. The data shall be submitted for storage immediately after the completion of the research. However the ownership of the data shall lie with the researcher until the research findings are published or for five years from the completion of the research. The data shall automatically become a public resource and shall be accessible after five years.

1.7.2.1. Data Sharing Protocol

1. Metadata from the CDR shall be open to the public: the following procedure (Figure 1.4) shall be followed for requisition of primary data from the CDR. The data owner reserves the right to render data access on mutually agreed conditions such as co-authorship and appropriate acknowledgement.
2. The proponent shall submit a written application for access into primary data and cite reasons for data requirement.
3. UWICER shall seek approval from the Department and the concerned data owner.
4. Upon approval of the concerned data owner, UWICER shall release the primary data with an intimation to the Department.
 - a) UWICER shall share the data as per existing rules and regulations or procedures.

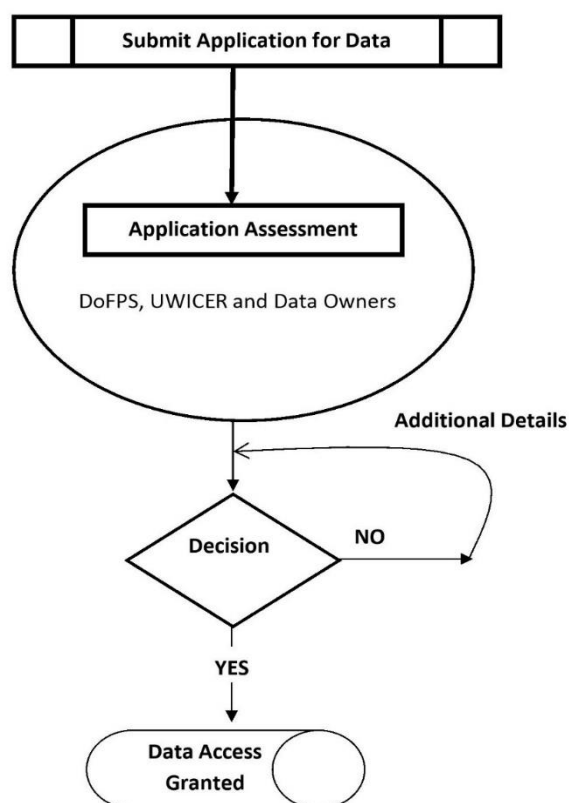


Figure 1.4 Process of Data Obtaining from Central Data Repository

1.7.2.2. Data Security

In order to keep data secure, the system administrator shall solely operate CDR. The following clauses shall apply to the system administrator:

1. The primary data shall not be released except upon approval from the data owner and the Department.
2. Safeguarding of primary data shall be the responsibility of the System Administrator.
3. Failure to comply with the clauses mentioned above shall lead to administrative action.



2. Mainstreaming Research Findings into Forest and Biodiversity Policies, Plans and Programs

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2. Mainstreaming Research Findings into Forest and Biodiversity Policies, Plans and Programs

2.1. Background

Research can play a pivotal role in making policy decisions for better natural resource management and give a real picture of on-the-ground realities. It is even more important for the research findings to be disseminated in a clear and concise form and incorporated into policies. Research findings shall be streamlined into practical management applications through various media like meetings, conferences, seminars, workshops, policy briefs, notifications, guidelines, journals, newsletters, audio-visuals, etc. and give decision-makers a basis for making informed decisions.

2.2. Dissemination of Research Results

The dissemination of research results to relevant stakeholders shall be done through appropriate forums such as research review, community awareness campaigns and periodic seminars. The research institute shall ensure that the research results and findings are simplified into field manuals and other extension materials.

Effort shall be made to make the research results widely available to the public, policymakers and other regional and international partners. This shall be done through publications in international/regional/national journals, annual reports, working documents, policy briefs, newsletters, guidelines, etc. Further, the research findings and results shall be uploaded on the web pages of relevant offices for wider dissemination. It shall be mandatory for any researcher to share technical reports and make a presentation of their findings in any relevant fora.

2.2.1 Discovery of New Species

Bhutan, being part of the Eastern Himalayan Biodiversity Hotspot, has been a place of continuous discovery of species which are either new-to-science or new records for Bhutan. Discovery of new species is the outcome of improving taxonomic skills and improved accessibility to the natural habitat which were not accessed during the past scientific expeditions. The advances in molecular genetics and genomics have also led to the refining of the phylogenies which were missed by the earlier methods of the discovery of new species.

A process to identify, assess and accept new species records requires a systematic scientific and administrative procedure. For the discovery of species which is new to science, the concerned researcher, discoverer or specimen collector shall submit diagnosis to the UWICER for review. A Taxa Specialist Committee comprising of experts from different agencies shall review and it shall be coordinated by UWICER. The reviewed diagnosis shall then be forwarded to the TAC of the Department for the approval or disapproval. The complete process is depicted in Figure 2.1. For the new species record, the respective taxonomic experts from relevant agencies shall verify the new record and submit their findings to the Department for the approval.

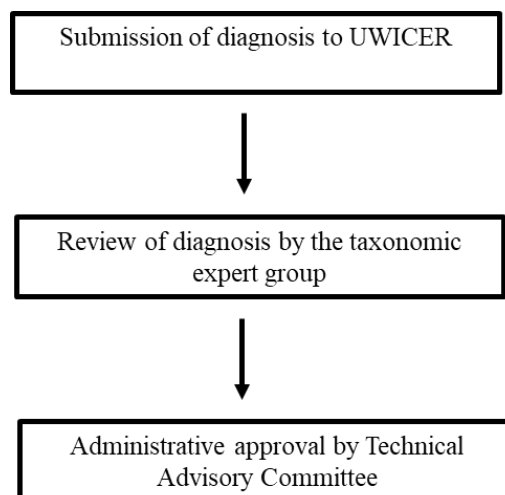


Figure 2.1 Process of New Species Discovery and Naming

2.3. Incorporating Research Recommendations into the Policies

The Department, shall strive to incorporate research recommendations into relevant Policies, Acts, Rules, strategies and planned documents. In addition, UWICER shall also carry out the following, whenever required:

1. Present relevant research findings to the Members of the National Assembly (Environment and Climate Change Committee) and National Council (Natural Resources and Environment Committee),
2. Present relevant research findings to the policy and decision makers, managers and planners.
3. Distribution and sharing of reports (research synthesis, policy and technical briefs, book of abstracts).

2.4. Monitoring and Evaluation

Systematic monitoring and reporting on forest and biodiversity research are critical for informed decision-making and shall continue to be. Regularly updating this information would provide a stronger foundation on which to base decisions by the policy makers. Proper follow up after commissioning of research studies is crucial to ensure that high quality research has been conducted within the planned period.

UWICER shall conduct mid-term and final review to ascertain progress for those research activities which are not endorsed during the RCM. Further, reports and presentation on field findings of research conducted by individuals shall be monitored and evaluated after completion of 6 months of research work or upon the completion of report writing, whichever is earlier.

2.5. Research Publication

Researchers shall follow publication format to conform to international standards of research publication. This is to ensure credibility and validation of scientific findings through peer-reviews. Research works should be published for reporting to the Government, donors and parent agencies. To enable researchers to improve their scientific writing skills, appropriate trainings shall be designed and imparted.

2.5.1. Technical Reports

A technical report is a document that describes the process, progress, or results of a research activity. Technical reports rarely undergo comprehensive independent peer review before publication. It is mandatory for the researchers to develop a technical report upon the completion of the research as the primary output. For technical reporting, use Table 2.1.

Table 2.1 Technical Report format

The following items are commonly included in a standard technical reports of the forestry sector, and it is not limited to the following;

1. Cover with a title
2. Foreword
3. Abstract
4. Table of contents
5. List of illustrations
6. Executive summary
7. Glossary and list of symbols
8. Introduction
 - Literature review
 - Significance of the subject in question
 - Objectives of the study/ research
9. Materials and Methods
 - Study area description
 - Study design
 - Field data collection
 - Data analysis, softwares and tools
10. Results
 - Summarizes the data collected for the study in the form of descriptive statistics
 - Reports the results of the relevant inferential statistical analyses
 - Results are discussion are sometimes combined here
11. Discussion
 - Management implications
 - Recommendations
 - Study limitations
 - Conclusion
12. Recommendations
13. Reference
14. Appendix

2.5.2. Peer-reviewed Articles

Peer-reviewed articles are research works published in journals, which undergo rigorous review by subject experts. The researcher or PI should aim to publish peer-reviewed articles.

2.5.3. Field Guides

Field Guide is a book for the identification of animals, birds, flowers, or other taxa (Schmidt, 2006). The Field Guides shall follow a standard format (Table 2.2). It shall be developed only if the subject has national coverage and shall be revised if there is any new information to be added such as a significant change in nomenclature or records of new species.

Table 2.2 Content of a Field guide

1. Cover with a title
2. Foreword
3. Table of contents
4. Purpose of the field guide
5. Characteristics of the family
6. Description of species:
 - i. Taxonomic hierarchy
 - ii. Species identity (Scientific name and common/local name)
 - iii. Illustration/photo of species
 - iv. A thorough description of the species; distribution, habitat type, altitudinal range.
 - v. Interesting information and facts about the species.

2.6. Bibliography

- Black, T. R. (1999). *Doing quantitative research in the social sciences: An integrated approach to research design, measurement and statistics*. Sage.
- McGinley, K. A., Guldin, R. W., &Cubbage, F. W. (2019). Forest Sector Research and Development Capacity. *Journal of Forestry*, 117(5), 443-461.
- Ministry of Agriculture and Forests (MoAF), 2011. National Forest Policy of Bhutan 2011. Ministry of Agriculture and Forests. Thimphu Bhutan.
- Schmidt, Diane. (2006). Field Guides in Academe: A Citation Study. *Journal of Academic Librarianship* 32(4):274-285.