STATUS REPORT

UGYEN WANGCHUCK INSTITUTE FOR FOREST RESEARCH AND TRAINING

July 2022 - June 2023

ANNUAL STATUS REPORT

JULY 2022 – JUNE 2023

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Editorial Board

Cover Photograph: *Bhutanitis ludlowi*: The National Butterfly of Bhutan.

Photo Courtesy: Karma Wangdi (UWIFoRT)

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FOREWORD

In the heart of the stunning Himalayan kingdom of Bhutan, where nature's grandeur flourishes in harmony with its rich cultural heritage, stands an institution dedicated to the preservation and understanding of the very essence of this remarkable land. The Ugyen Wangchuck Institute for Forest Research and Training (UWIFoRT) is a beacon of knowledge, commitment, and collaboration in the realm of environmental conservation and forestry.

Established in 2004, UWIFoRT's journey has been one of relentless pursuit, the pursuit of knowledge that enlightens, of practices that sustain, and of a future that honors both the past and the potential. Named in honor of the visionary First King of Bhutan, Gongsar Ugyen Wangchuck, the institute embodies his spirit of forward-looking leadership and reverence for the land.

At UWIFoRT, a symphony of scientific inquiry, traditional wisdom, and modern methodologies converge. The institute's tireless dedication to research illuminates the intricacies of Bhutan's ecosystems, unraveling their secrets to inform sound conservation strategies. From the vibrant lowlands to the rugged alpine landscapes, UWIFoRT's experts delve into the depths of biodiversity, climate dynamics, and sustainable forestry practices, all with a resolute commitment to safeguarding Bhutan's natural heritage.

Beyond its scientific endeavors, UWIFoRT is a nurturing ground for future custodians of Bhutan's environment. The institute's educational programs and training initiatives equip individuals with the knowledge and skills to champion conservation efforts, ensuring that the flames of commitment burn brightly for generations to come.

In this volume, we invite you to embark on a journey of discovery, a journey that takes you through the corridors of UWIFoRT's wisdom, the groves of its insights, and the landscapes of its aspirations. As you turn these pages, you will encounter the stories of passionate researchers, resilient communities, and the delicate dance between tradition and progress. UWIFoRT's story is one of synergy, an intertwining of cultures, disciplines, and ideologies all focused on a singular purpose: to cherish and protect the splendor of Bhutan's natural world.

In the name of conservation, in homage to heritage, and in pursuit of a brighter tomorrow, we celebrate the Ugyen Wangchuck Institute for Forest Research and Training - a sanctuary of knowledge, a bastion of hope, and a testament to the boundless possibilities of harmony between humanity and nature.

Message from the HEAD SPECIALIST

As we start the fiscal year 2023-2024, I am delighted to share the remarkable achievements and transformative development that have taken place at UWIFoRT.

Previous fiscal year, UWIFoRT has witnessed a series of transformative events that led to the reassignment of some of our valued team members to various field offices. However, with less, the institute has been able to move forward and make significant accomplishments that reflect the dedication and hard work of our talented team.

Keeping up with the institute's mandate, we have made remarkable progress in areas of training and research. Our commitment to generation and transfer has resulted in the successful execution of training programs which are critical for transferring time-relevant knowledge and skills to forestry professionals working in the field. In all, we have conducted 21 numbers of research and trained 562 numbers of forestry officials. As a part of our research work, we made several new discoveries and added 27 numbers to the species list of our country. Our research initiative has led to valuable insights and contributed to a deeper understanding of forest ecosystems and the generation of technology that can support innovative and sustainable forest management practices.

As we reflect on the past year's accomplishments, we are filled with a sense of pride and gratitude for the dedication of our team and the unwavering support of our partners. Looking ahead, we may have to reinvent and realign our research efforts and training in order to keep up with the changing needs of the country. In the coming fiscal year, we look forward to groundbreaking research, innovative training, strengthening old partnerships, and seeking new collaboration that will continue to elevate the reputation of UWIFoRT as a leader in Forestry research and training.

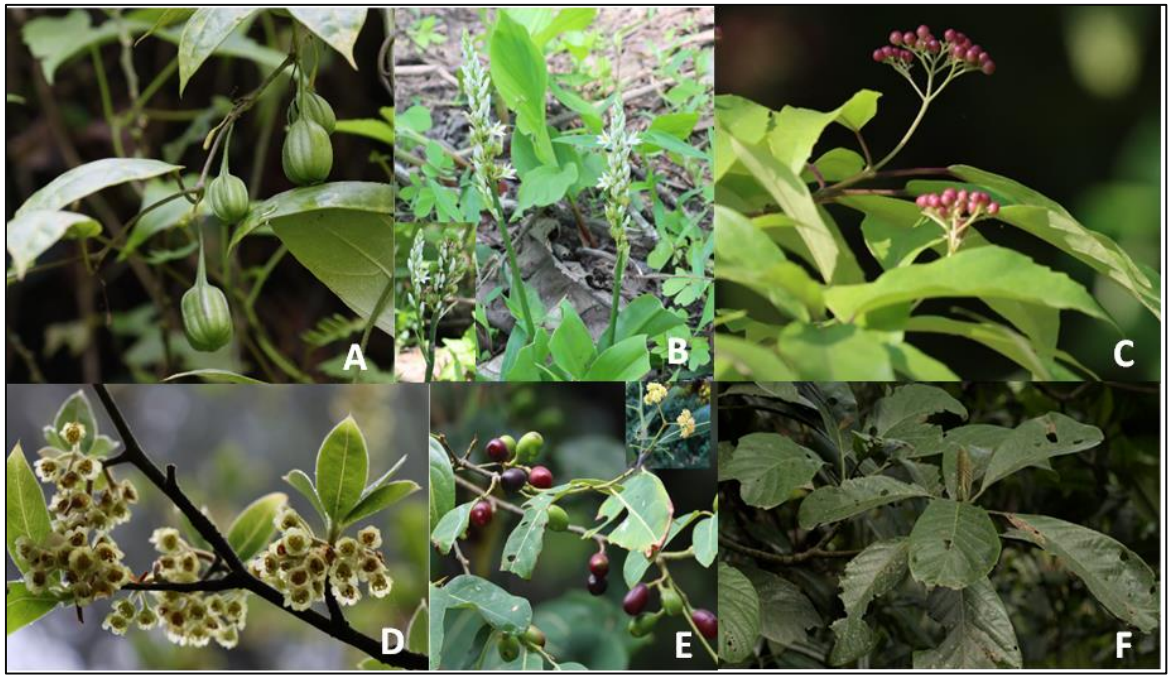
I would like to extend my heartfelt gratitude to our senior colleagues and all our team members for their hard work and commitment to our shared vision.

Wish you all the best and looking forward to another successful year.

HIGHLIGHTS AND DISCOVERIES

- ***Nine new records of plants from Bhutan***

We reported nine new species of angiosperms plants that were new to the flora of Bhutan. Four of these species were found in tropical biomes along the southern border, Assam, and the West Bengal region of India, while four others were discovered in warm-broadleaf forests in the central region. Only one species was recorded from the temperate forest. Amongst the nine new records, four species of tree were from Lauraceae, Phyllanthaceae, Sapindaceae, and Utricaceae. Three species of shrubs were from Lamiaceae and Lauraceae, and two species of herbs from the families Aristolochiaceae and Asparagaceae. The new species were reported by Wangchuk *et al.* in the Korean Journal of Plant Taxonomy.



A. Aristolochia indica Linn (Aristochiaceae).

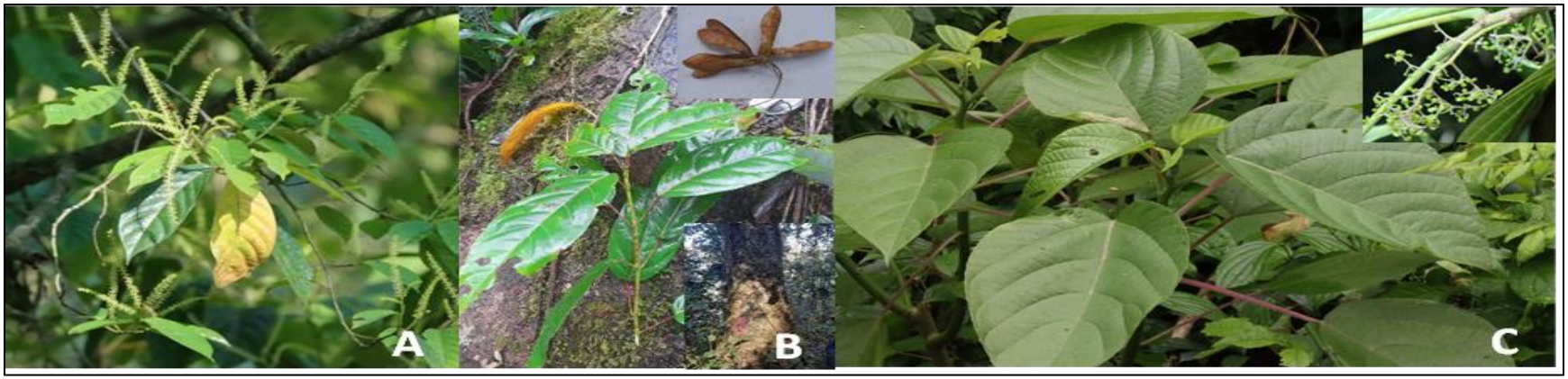
B. Chlorophytum tuberosum Roxb. (Asparagaceae).

C. Premna esculenta Roxb (Lamiaceae)

D. Lindera umbellata Thunb (Lauraceae)

E. Litsea chartacea Wall. (Lauraceae)

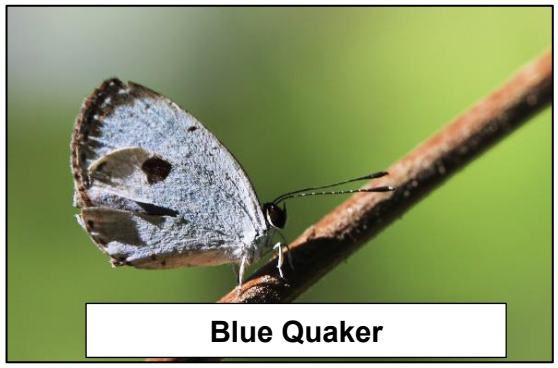
F. Litsea grandis Wall. (Lauraceae)



A. Antidesma montanum Blume (Phyllanthaceae). B. Acer laurinum hassk (Aceraceae). C. Dendrocnide excelsa (Urticaceae). (Photo courtesy: Jigme Wangchuk, UWIFoRT)

- ***New species of butterflies recorded***

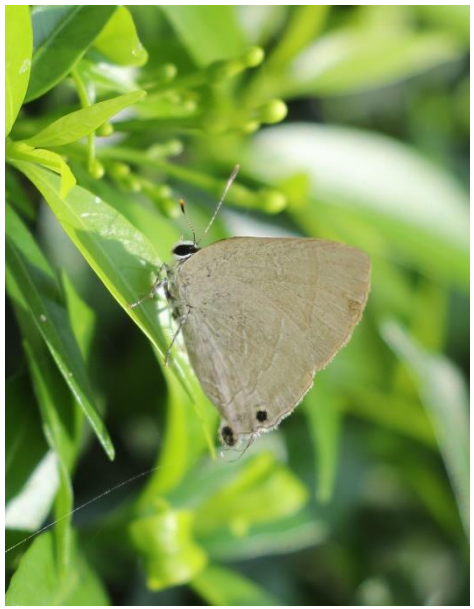
Mr. Karma Wangdi, a ranger and a passionate lepidopterist recorded 7 new species of butterflies from across the country in collaboration with lepidopterists from Italy, Japan, and national researchers. With these observations, Bhutan now has a total of 778 species of butterflies.



Branded Yamfly

Common Yellow Swallowtail

Spotted Yellow Lancer



Scarce Shoot Flash

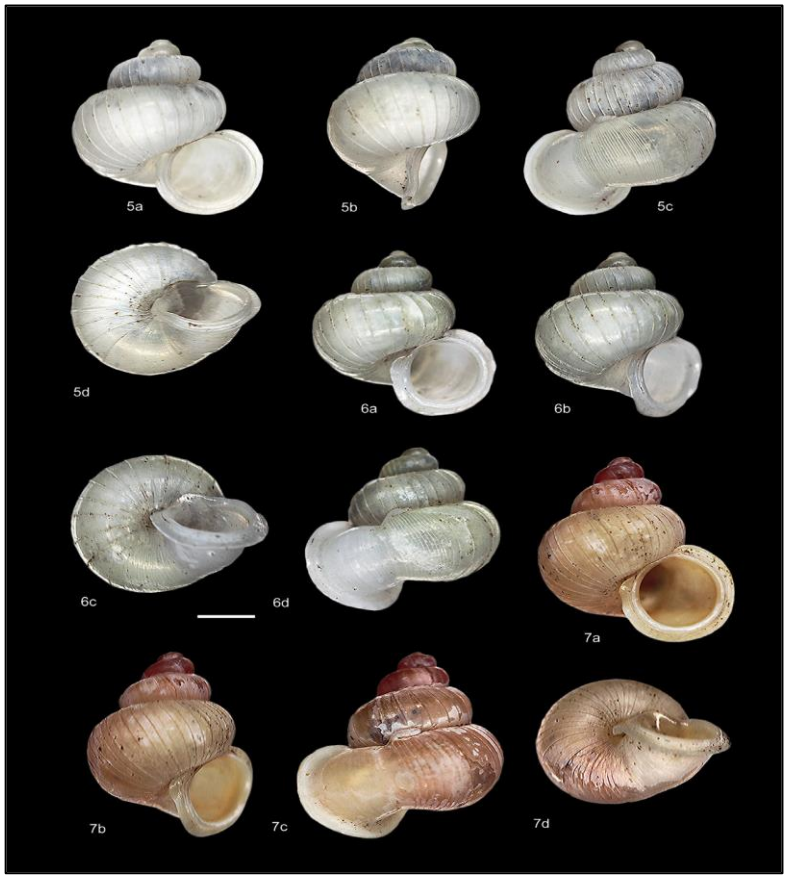
Photo courtesy:

Karma Wangdi

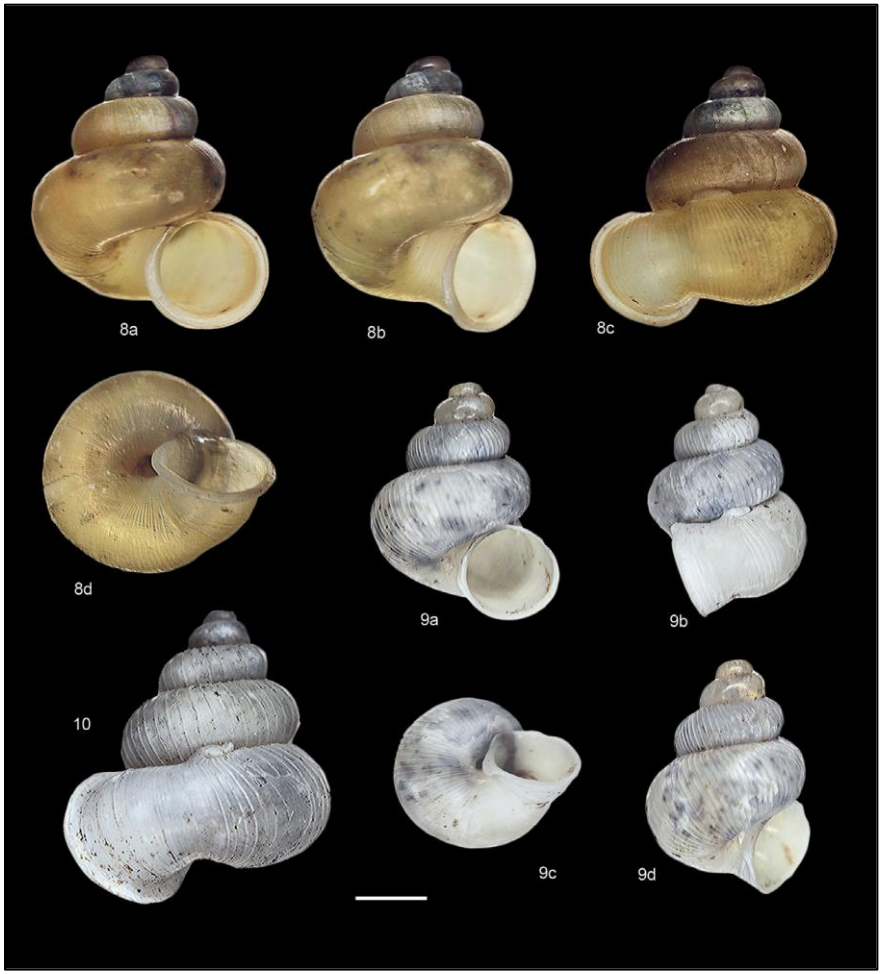
UWIFoRT

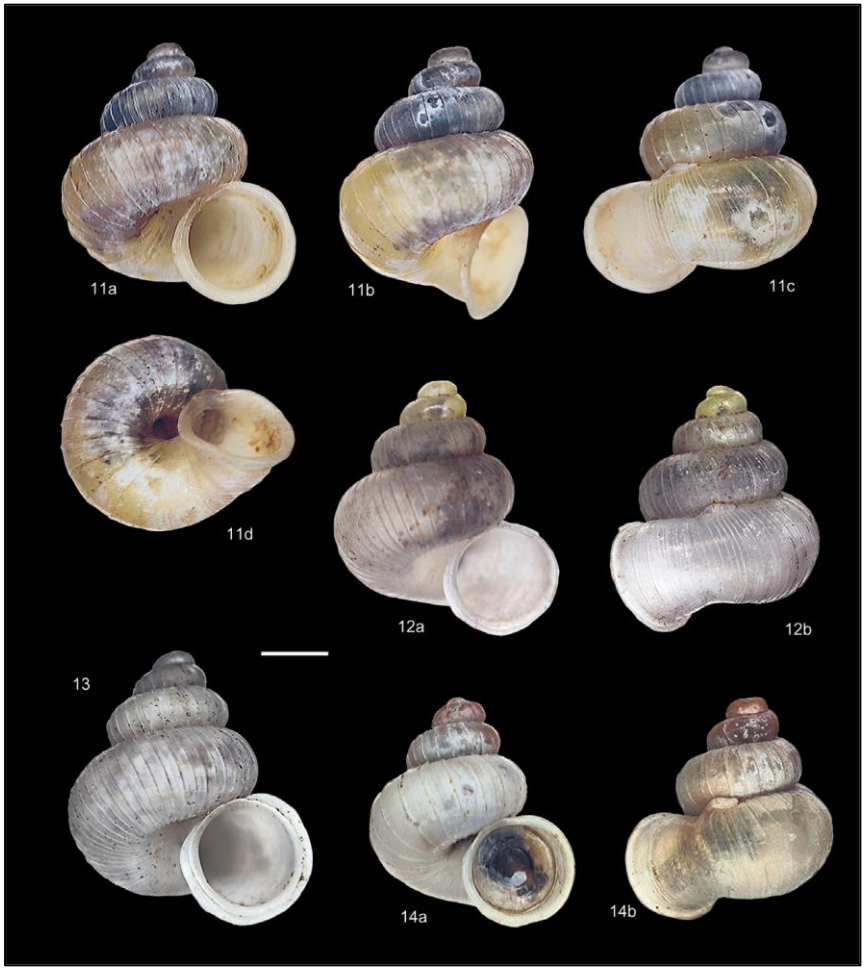
- ***The genera Dioryx and Cycloryx (Gastropoda, Caenogastropoda, Alycaeidae) in Bhutan, with a description of four new species.***

We reported from Bhutan *Dioryx urnula* (Benson, 1853) and 7 *Cycloryx* species, 4 of which were recorded as new to science. The article was published in the Journal of the Netherlands Malacological Society.



3. *Dioryx urnula* (Benson, 1853), **4.** Alycaeidae: **5–7.** *Cycloryx* spec: **5.** *C. sajumbiclausus,* **6.** *C. haumbiclausus*, **7.** *C. otiphorus* (Benson, 1859).

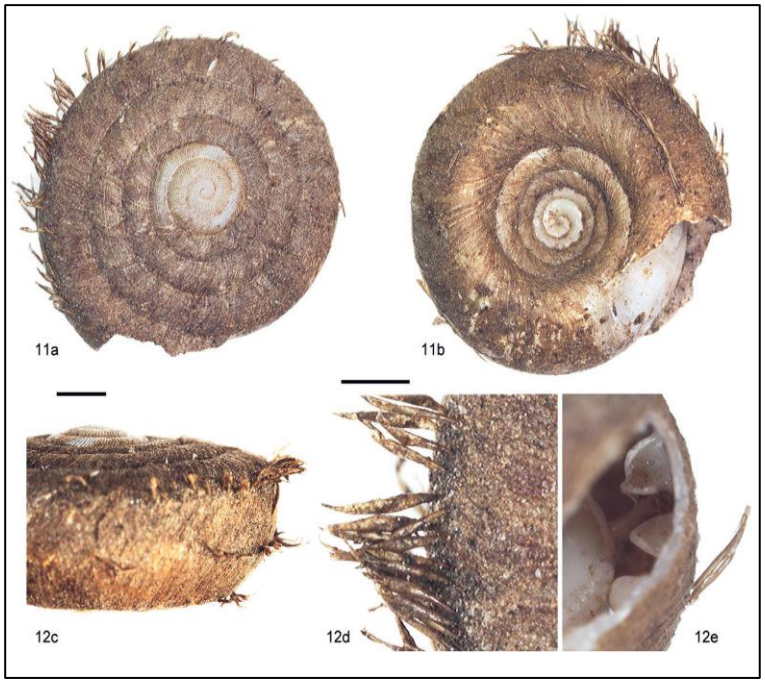


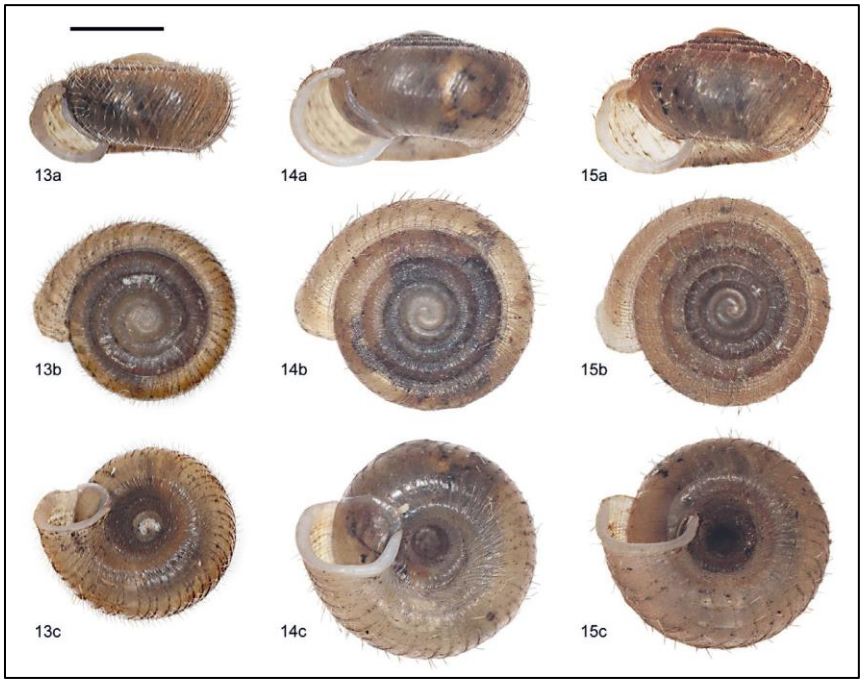


8–10. *Cycloryx spec.* **8**. *C. bembex* (Benson, 1859), **10.** *C. constrictus* (Benson, 1851), **11**. *C. bembex* (Benson, 1859), **12-13**. *C. constrictus* (Benson, 1851), **14.** *C. cf. constrictus* (Benson, 1851)

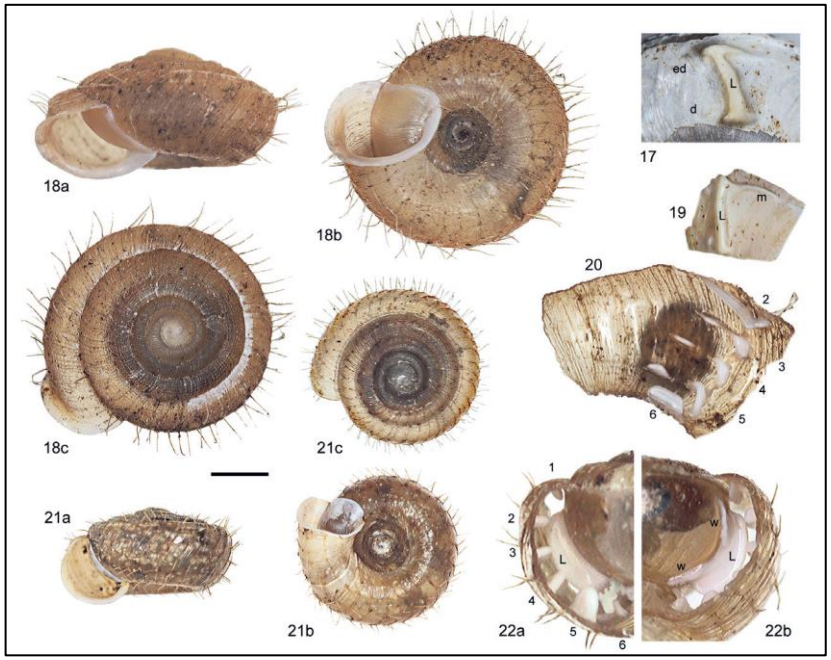
- ***High diversity of Endothyrella (Gastropoda, Pulmonata, Plectopylidae) in Bhutan, with a description of four new species***

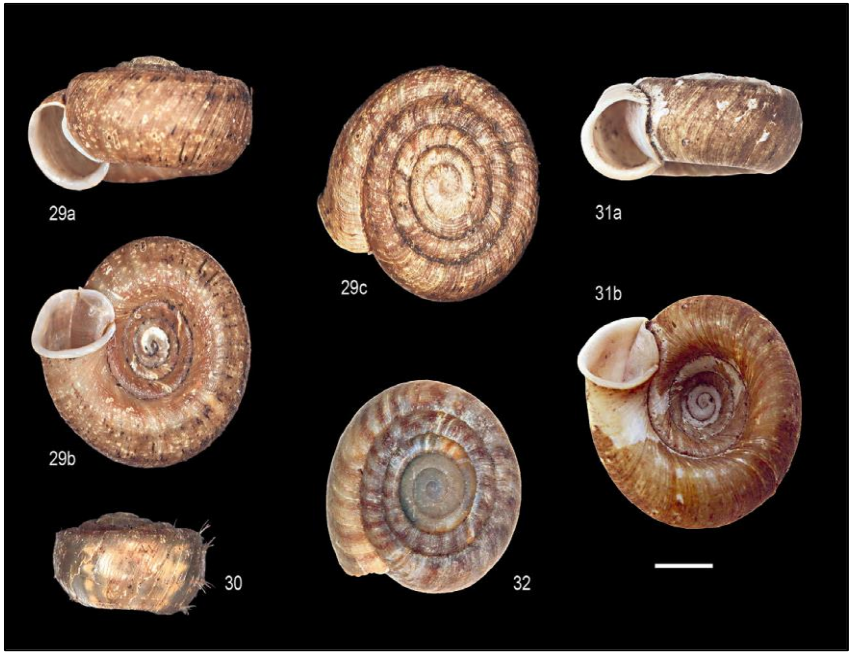
Recent fieldwork in Bhutan resulted in the discovery of 4 endemic species of *Endothyrella* that are described as new to science, viz. *E. barnai* Gittenberger & Sherub, *E. manasensis* Gittenberger & Sherub, *E. pterocallus* Gittenberger, Gyeltshen & Tobgay, and *E. trimagnipili Gittenberger*, Gyeltshen & Tobgay. This results in a total of 9 *Endothyrella* species for Bhutan, 7 of which are not known from elsewhere. The article was published in the Journal of the Netherlands Malacological Society.





Endothyrella species, **11.** *E. barnai*, **12**. *Endothyrella trimagnipili*, **13.** *E. bhutanensis,* **14-15.** *E. blanda,*

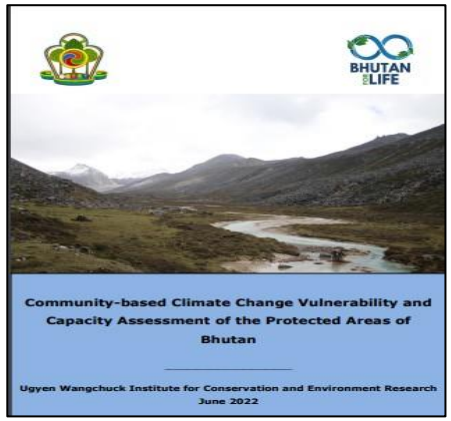




17. *E. barnai,* **18-20.** *E. plectostoma* (Benson, 1836), **21-22.** *E. pterocallus* **29-30.** *E. spirostriata*, **31-32.** *E. pemagatshel.*

RESEARCH ACTIVITIES COMPLETED

- ***Assessment of community climate vulnerability and capacity assessment to develop adaptation plan for Protected Areas Networks***



The study was carried out in 14 PAs including all National Parks/ Sanctuaries/ Reserves and 4 of the 8 Biological Corridors with higher human settlements. Social questionnaire survey was conducted to assess community exposure, sensitivity and adaptation capacity to climate change. Vulnerability index for each PA was computed as a function of exposure, sensitivity and adaptive capacity.

- ***Agroforestry model development project***

This research aimed to establish wildlife-friendly farms using Agroforestry in Yagang and Gengu villages to mitigate Human-Wildlife Conflicts (HWC). By integrating trees, crops, and livestock, the project intended to enhance livelihoods, reduce HWC intensity, and improve food security. Proposed measures included buffer plantations, wildlife-friendly crops, fruit trees, and training. Policy recommendations encompassed long-term research, awareness, infrastructure development, collaboration, guidelines, and marketing strategies.

- ***Review of the Community Forestry program in Bhutan and its impact on rural timber supply***

Over 30 years, Bhutan instituted 839 Community Forests (CFs), spanning 108,879 hectares, benefiting 34,169 rural households (25% of the total). To evaluate effectiveness, the study reviewed 174 CFs, analyzing documents, surveys, and national data. Results revealed CFMGs manage sustainably, yielding social benefits. The report aims to address policy and institutional gaps for improved outcomes. Despite challenges, the CF program contributes positively to local communities.

- ***Dietary analysis of Black-necked Crane (BNC)***

To understand the winter dietary composition in BNC at Bumdeling, we collected fecal samples from seven major feeding and one roosting area along Kholongchu valley at Trashiyangtse. The study's primary objective is to understand dietary composition, which is one of the detrimental factors for long-term survival. Fecal sample analysis was carried out in the laboratory. Dry fecal samples were soaked in Petri dishes for 2 - 5 hrs. Remnants of undigested food materials were segregated and mounted on glass slides. Each slide with food samples was studied under a microscope and photographed to identify ingested floral and faunal species. A plant botanist and macro-invertebrate entomologist were engaged in the correct identification of ingested food material. From this study, we will be able to provide supplemental food during the winter season. RSPN funded this research.

- ***Conducted research on primates' distribution and disturbances***

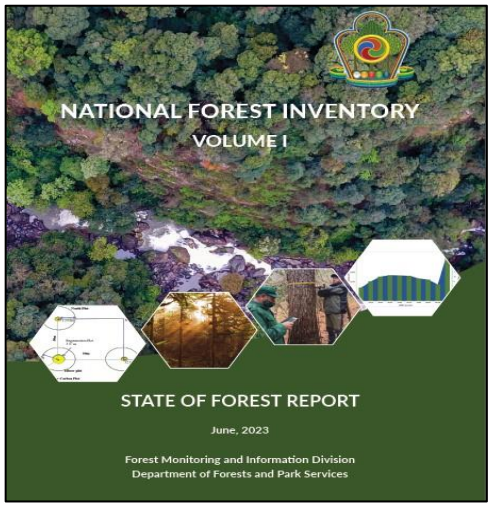
The project seeks a middle path supportive of local people's livelihoods and primates' ecology through the conduct of citizen science research to generate knowledge for the management of primate species, validation of actions to mitigate human-golden langur conflicts, and develop conservation ethos by enlisting the help of women, school children, and monks to inculcate human connection to nature. In this project, we will build on my preliminary data for this species, which also yielded information on langurs' group sizes, locations, and compositions and on farmers' encounters with and views of langurs.

- ***Impact of climate change on timberline and its socio-economic implications on Highlander***

The PEER-funded project investigated the impact of climate change on Bhutan's alpine tree line and highland pasture areas. Preliminary findings of the satellite data analysis show evidence of tree line ecotone shift towards higher elevation. The project's broader aim was to comprehend the socio-economic repercussions of these ecological changes on highland communities, encompassing policy, socio-economic, and bio-physical dimensions.

- ***Processed and analyzed NFI tree core samples***

More than 4100+ core samples were processed, analyzed, and submitted for compilation to the National Forestry Inventory Working Group. These data were used to estimate basal area increment and volume increment for the National Forest Inventory: State of Forest Report. Taking the basal area estimated herein as a reference, the basal area of the individual tree before five years is estimated from the increment data estimated from the tree core collected as part of the NFI. The measurements were conducted in the Dendrochronology Laboratory located in UWIFoRT.

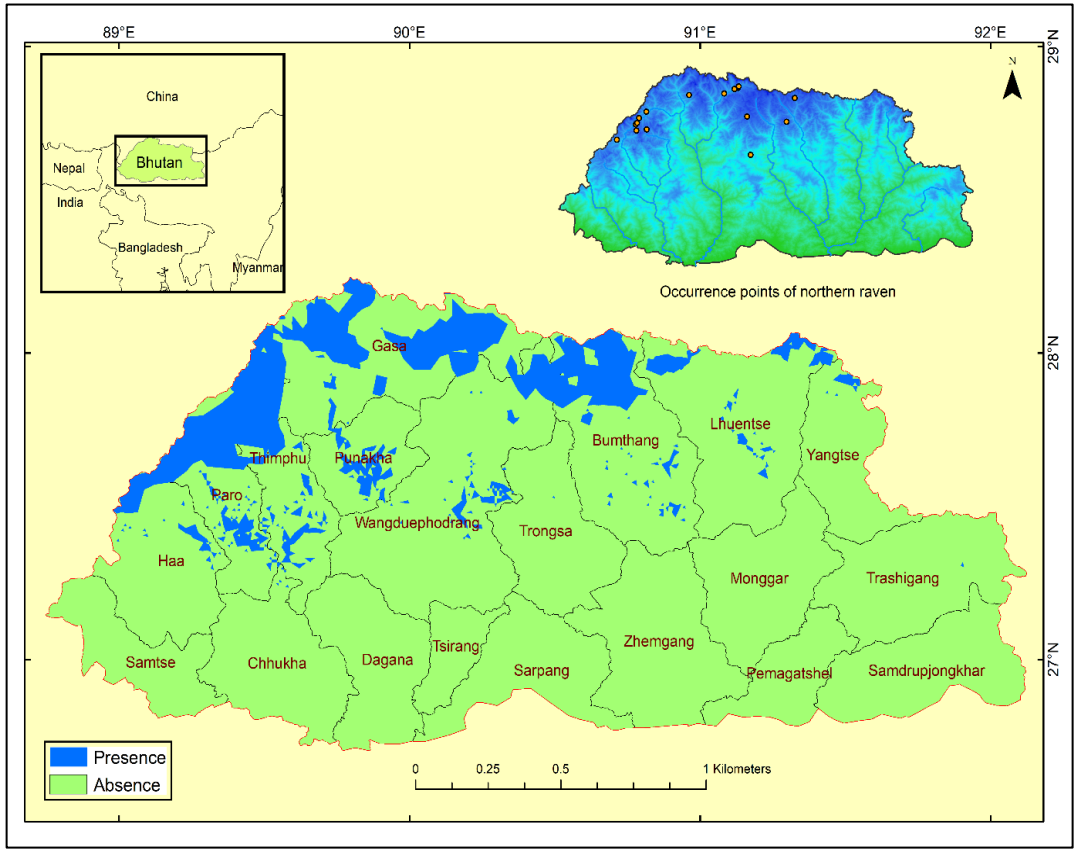


- ***Review of AFoCO project activities (identify vulnerable communities, document indigenous adaptation practices, and climate-smart adaptation measures)***

This study focused on the review of the documents maintained by the Community Forestry Management Groups (CFMGs) and administered a set of questionnaires with a single CF as an individual respondent. The study covered 174 CFs in 15 Dzongkhags the sample size of which is about 22% of the total CFs in the covered Dzongkhags. A detailed report of the above project has been submitted to the Department of Forest and Park Services in remedying some of the policy, technical, and institutional shortcomings.

- ***Distribution study of Raven***

Northern raven was mostly observed towards the north of the country. The presence of the Raven was recorded from five Dzongkhag. The highest occurrence data was recorded from Thimphu, followed by Gasa. A total of 17 occurrence points were recorded from five Dzongkhags.



- ***Corvids in Bhutan and conservation management***

The study conducted in Bhutan centered around investigating species within the Corvidae family, including crows, choughs, and related birds. The primary objectives encompassed obtaining foundational insights into crow species and addressing the specific challenges they pose in Bhutan's context, with special attention given to the house crow, an invasive species. The research spanned six Corvid species: the northern raven, large-billed crow, eastern jungle crow, house crow, yellow-billed chough, and red-billed chough. This comprehensive study covered the entirety of Bhutan, spanning all administrative districts, and data collection transpired between May and July 2022, facilitated by the EpiCollect5 platform. The data underwent rigorous analysis utilizing a range of tools, including Microsoft Excel, ArcGIS 10.5, R 4.3.0, and Maxent V3.4.4.

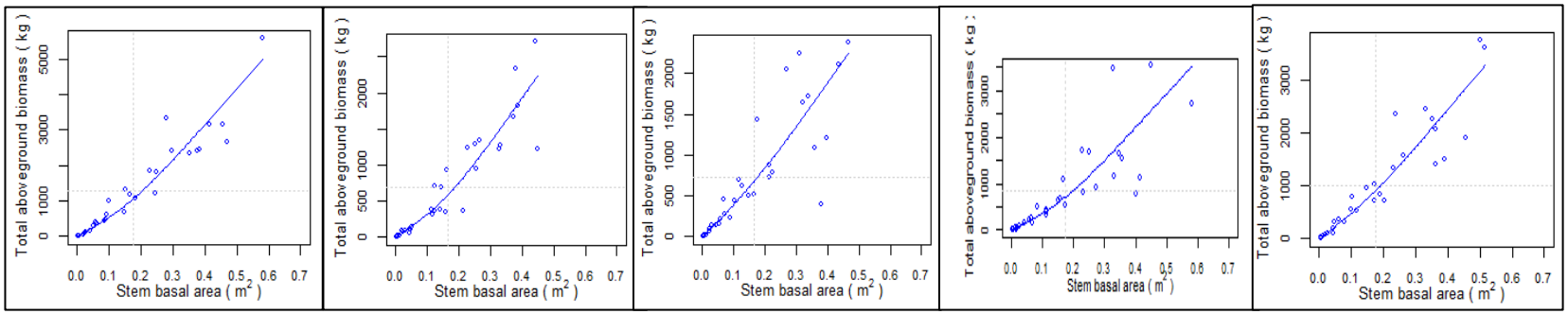
The predictive modeling by Maxent yielded distribution estimates for each species: red-billed chough (6402 km2), yellow-billed chough (3159 km2), northern raven (3951 km2), eastern jungle crow (2828 km2), large-billed crow (12717 km2), and house crow (11599 km2). Complementary measures like proper waste management and public education were deemed essential, underscoring the importance of cross-boundary coordination to address the escalating house crow population and its potential consequences.

- **74 research clearances reviewed and processed**

The Ugyen Wangchuck Institute for Forest Research and Training, as the clearance house of research permit under the Department of Forests and Park Services, Ministry of Energy and Natural Resources, has received a total of 83 applications in the field of the forest, and wildlife and environment-related research, all across the country. With the support of the reviewers, including multisectoral subject experts, the institute has reviewed and approved 74 applications within 14 days as per the rules and regulations.

- ***Tree biomass allometric equations***

We have developed biomass allometric equations for five broadleaved tree species (*Quercus lamellosa, Rhododendron grande, Phoebe hainesiana, Populus ciliata & Engelhardtia spicata)* and submitted to the Department of Forest and Park Services in the fiscal year 2022-2023. So far, the institute have developed 37 allometric equation, which includes tree species-specific biomass allometric equation for 8 conifer species, 27 broadleaved species and 2 general equations.



Quercus lamellose	*Rhodendron grande*	*Phoebe hainesiana*	*Populus ciliate*	*Engelherdia ciliata*

- ***Agarwood Inducement in Aquilaria malaccensis with Mechanical Methods for Rural Poverty Alleviation***

The Subtropical Forestry Technology Research Sub-Center located at Gelphu, Sarpang Dzongkhag is exploring the potential agarwood inducement through mechanical methods with the aim to Evaluate and test six different wounding methods that have the potential to induce agarwood formation in the 4 years old plantation site, develop and provide an effective method at an affordable cost for agarwood cultivars.

PROFESSIONAL TRAINING/SEMINAR/WORKSHOP

National Training/workshops and seminars

1. ***Advanced Bird Watching Expedition for Tour Guide upskilling training (15 December – 21 January 2023)***

A total of 19 tour guides participated in a 35-day upskilling training program on Advanced Bird Watching Expedition. The training was conducted by the UWIFoRT. The program was funded through the Skills Development Program (SDP) of the then Ministry of Labour and Human Resources. The Department of Tourism, and the then Ministry of Economic Affairs, collaborated in organizing the training course.

2. ***A Nature Guide Training to Upskilling and Empowering Youth (1st – 10th May 2023)***

The training was a tailor-made intensive training program designed for 8 aspiring local guides from Haa. The training focused on various aspects of nature, including birds, plants, butterflies, and mammals. The program was a collaborative effort of the UWIFoRT. The training received financial support from the Global Environment Facility - Least Developed Countries Fund (GEF-LDCF).

3. ***Basic GPS and SW Maps training for the Youths of Merak (21-25 October 2022)***

A five-day training session on basic GPS and SW Maps was conducted for the youths of Merak Geog from October 21st to 25th, 2022. The training was organized as part of the PEER project, which focused on the impact of climate change on the alpine timberline and the socio-economic effects on highlanders in Bhutan. The project received funding from USAID. A total of 12 youths, consisting of 5 boys and 7 girls, actively participated in the training program.

4. Basic GPS and SW Maps training for the Youths of Sakteng (26-31 October 2022).

A five-day training program on basic GPS and SW Maps was conducted for the youths of Sakteng Geog from October 26th to 31st, 2022 at the Sakteng Park Range office. The training was organized as part of the PEER project, which focused on the impact of climate change on the alpine timberline and the socio-economic effects on highlanders in Bhutan. A total of 8 youths, consisting of 5 boys and 3 girls, actively participated in the training program.

5. Computer Literacy (14-18 November 2022)

A group of 22 foresters from the Department's 24 field offices attended a week-long training program on computer literacy. The training took place on UWIFoRT campus. The training was a part of the Department's plans to transition toward digital forestry services and to equip field foresters with digital skills for effective service delivery.

6. Basic SPSS (Statistical Package for the Social Sciences) Training (14-22 November 2022)

A basic SPSS training program was successfully conducted in Phuentsholing from November 14th to November 22nd, 2022. The training aimed to cater to the specific needs of the stakeholders involved in the project titled "Development of an Agroforestry Model as an Alternative Livelihood Option in Human-Wildlife Conflict Hotspots.

The Non-wood Forest Product and Agro-forestry Technology Sub-Center, a part of the institute, took the responsibility of organizing the training program. The Bhutan Trust Fund for Environmental Conservation (BTEFC) provided the necessary funding for this initiative.

7. Training on GIS Application (21-25 November 2022)

A group of 28 foresters representing 24 field offices under the Department had gathered on campus to participate in a comprehensive week-long training program focused on GIS Application.

The training was led by Mr. Arun Rai, Principal Forestry Officer, and Mr. Dawa Zangpo, Deputy Chief Forestry Officer of the Forest Resources Management Division (FRMD) of the Department. Financial support for the training program was provided by the Bhutan for Life Project (BFL), funded by the Green Climate Fund (GCF).

8. Advanced Forest Management (28 November - 2 December 2022).

A group of 24 foresters from different field offices of the Department recently completed a comprehensive week-long training program on Advanced Forest Management.

The training was led by Mr. Tashi Waiba, the Deputy Chief Forest Officer of the FRMD of the Department. Financial support for the training program was provided by BFL and GCF.

10. Advanced Park Management (19-23 December 2022)

A week-long course on advanced park management at UWIFoRT campus aimed to enhance the skills and knowledge of 23 participating foresters. The training focused on equipping them with tools and techniques to effectively manage and conserve park ecosystems in Bhutan.

The training program was facilitated by Namgay Bidha and Letro, Deputy Chief Forestry Officers of the Nature Conservation Division of the Department. Financial support for the course was provided by BFL and GCF.

11. Training workshop report on Ecological niche modeling of GALS (16-20th January 2023)

The Technical Working Group (TWG) comprising the Bhutan Food and Drug Authority (BFDA), UWIFoRT, and the Department of Environment and Climate Change (DoECC) organized a five-day cross-sectoral agency training workshop on Ecological Niche Modeling (ENM) for the Giant African Land Snail (GALS).

A total of 22 participants attended the training, represented by the Department, BFDA, National Biodiversity Center, DoECC, CNR, Samtse College of Education, and Sherubtse College.

12. Primate Survey Methods Training and Data Inter-observer Reliability Test (17th – 18th February 2023)

20 foresters from Jigme Singye Wangchuck National Park, Royal Manas National Park, and Zhemgang Forest Division participated in a two-day training on primate survey methodologies held in Tingtibi, Zhemgang. The training program was conducted as part of the citizen scientist capacity development component, which received funding from USAID, the NAS, and the PEERS project.

13. Primate Survey Methods Training and Data Inter-observer Reliability Test (2nd – 3rd March 2023)

16 foresters from Jigme Singye Wangchuck National Park, Royal Manas National Park, Dagana, Tsirang, and Sarpang Forest Division actively participated in a two-day training program on primate survey methodologies, which took place in Gelephu, Sarpang on March 2nd and 3rd, 2023.

The training initiative was a part of the citizen scientist capacity development component, which received funding from USAID, the NAS, and the PEERS project.

14. Training on Snake Handling for the southern region from (6th February to 1st March 2023)

The UWIFoRT, in collaboration with the Phibsoo Wildlife Sanctuary, organized a series of one-day training on snake handling for the southern region starting from February 6th, 2023. The training was conducted for the territorial forest divisions of Gedu, Samtse, Samdrup Jongkhar, Sarpang, Tsirang, and Zhemgang, as well as the protected area systems of Jomotshangkha Wildlife Sanctuary, Phibsoo Wildlife Sanctuary, and Royal Manas National Park in Gelephu which was attended by a total of 287 foresters.

15. Forest Nursery Development Training (22nd – 31st May 2023)

A course on Forest Nursery Development was conducted for 16 foresters from the IKI landscape, which comprised 9 territorial forest divisions. The nursery development training marked the second in a series of training programs conducted with financial support from the IKI Project. The continued support from the project highlights its commitment to promoting sustainable forest management practices and strengthening the capabilities of foresters in the IKI landscape.

16. Mapping, monitoring, and surveillance of Illegal Activities using UAS (Drone) and Image Processing Training (17th – 28th May 2023)

A training program on Mapping, Monitoring, and Surveillance of Illegal Activities using UAS (Drone) and Image Processing was conducted, and 32 foresters from the DoFPS participated in the training. The

training program took place from May 17th to May 28th, 2023, and it was organized in collaboration with UWIFoRT and the Forest Monitoring and Information Division of the DoFPS and Aero-TECH Bhutan

17. School teachers attended Geospatial Technology Training (5-9 June 2023).

20 teachers (8 female and 12 male) from Trongsa, Zhemgang, Sarpang, Dagana, Tsirang, and Wangdue Phrodrang attended a 5-day training on geospatial technology as a tool to deliver geography and environmental science subjects in the schools. The training was supported by USAID, PEERS Project.

18. Plant Taxonomic Training for Forestry Officials (5-11 June 2023).

The institute (UWIFoRT) successfully hosted a week-long Plant Taxonomic Training program, starting today on World Environment Day (5th June 2023). The training program saw the participation of 21 forestry officials from various field offices of the Department and aimed to enhance their knowledge and skills in plant taxonomy.

19. Nature Tour Guide Training Curriculum Validation

A three-day meeting was organized from 8th to 10th June 2023 at the Technical Trainers Training Resources Center (TTTRC) located in Sarpang Dzongkhag to validate the reviewed and developed curriculum for the Nature Tour Guide Training. Department of Tourism provided the necessary funding for the meeting. A total of 13 officials attended the validation meeting at Sarpang.

UWIFoRT in the NEWS

Forester dedicates spare time researching butterflies for over two decades

October 8, 2022

Forester recognised for his contribution in conserving butterflies

November 9, 2022

BBS ENG DZO Radio-1 Streaming | Radio-2 Streaming

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Nine new plant species discovered as new additions to Bhutan's flora

Top Stories

July 9, 2023

Certificate Course in Forestry

Professional Foresters Certificate Course, 1st July 2022 – June 2023

The institute successfully inducted 15 Professional Forester Certificate course trainees, including five female trainees. This batch studied subjects such as Forestry Administration, Botany, Silviculture, Forest Mensuration, Nature Conservation and Management, Forest Management, Forest Inventory, Forest Nursery and Plantation, and Physical Education and Conduct.

Interns

Two interns (females) from the College of Natural Resources (CNR) were attached to UWIFoRT for a duration of three weeks (July, 2023). While at the Institute, they were attached to researchers and officials from different centers. We hope that this opportunity not only gave the students real-life experience in the workplace but also helped them gain critical work skills, which will help their careers.

PUBLICATIONS AND MEDIA OUTPUTS

International peer-reviewed articles

1. Gittenberger, E., C. Gyeltshen, K. Tobgay & **Sherub, S.** (2022). The genera *Dioryx* and *Cycloryx* (Gastropoda, Caenogastropoda, Alycaeidae) in Bhutan, with a description of four new species. *Basteria, 86(2).*
2. Gittenberger, E., C. Gyeltshen, K. Tobgay & **Sherub, S.** (2022). High diversity of *Endothyrella* (Gastropoda, Pulmonata, Plectopylidae) in Bhutan, with a description of four new species. *Basteria, 86(2).*
3. Wangdi, N., Ahmed, I. U., Mayer, M., Nirola, M. P., **Orong, K.,** Zangmo, N., Godbold, D. L., Gratzer, G., & Schindlbacher, A. (2023). Estimating the response of Himalayan old-growth mountain forests to decreased monsoon precipitation. *Agricultural and Forest Meteorology, 336.* https://doi.org/10.1016/j.agrformet.2023.109471.
4. **Tshering, C**., & Wangmo, T. (2023). Floristic Composition and Species Diversity of Wintering Herbs in Blue Pine Forest of Thimphu District, Bhutan. *Asian Plant Research Journal, 11(3), 1-12*. https://doi.org/Article no.APRJ.98272.
5. **Tshering, C**., Tenzin, K., & Nguyen, Thiet. V. (2023). A review of the current state and future prospects of dendrochronological research in Bhutan. *Tree-Ring Research, 79(2),* 1-9. https://doi.org/10.3959/2022-6.
6. **Wangchuk, J., Tshering, T.,** Dorji, D., & Wangdi, K. (2023). Nine new records of plants from Bhutan. *Korean Journal of Plant Taxonomy, 53(2)*, 170-180. https://doi.org/10.11110/kjpt.2023.53.2.170.

Technical Reports

1. UWIFoRT. (2022). *Community-based Climate Change Vulnerability and Capacity Assessment of the Protected Areas of Bhutan.* Department of Forests and Park Services, Ministry of Agriculture and Forests.

2. UWIFoRT. (2023). *Three decades of Community Forestry in Bhutan: an assessment report of the review of its extent and management effectiveness*. Department of Forests and Park Services, Ministry of Energy and Natural Resources.

3. UWIFoRT. (2023). *Corvids in Bhutan and Conservation Management*. Department of Forests and Park Services, Ministry of Energy and Natural Resources.

4. UWIFoRT. (2023). *Spring Migration and Seasonal Home Range of Black necked-Crane (Grus nigricollis): Insights from Bio-logged Crane.* Department of Forests and Park Services, Ministry of Energy and Natural Resources.

5. UWIFoRT. (2023). *Spring Migration and Home Range of Ruddy Shelduck (Tandorna ferruginea).* Department of Forests and Park Services, Ministry of Energy and Natural Resources.

6. UWIFoRT. (2023). *Spring Migration and Seasonal Home Range of Snow Pigeon (Columba leuconota)*. Department of Forests and Park Services, Ministry of Energy and Natural Resources.

PARTNERS AND SUPPORTERS

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The Ugyen Wangchuck Institute for Forestry Research and Training (UWIFoRT) operates as a government-affiliated research and training institution with a core objective of promoting responsible management of Bhutan's natural resources. Our mission centers on advancing this goal through robust scientific research and the dissemination of state-of-the-art findings to environmental practitioners, policy makers, and leaders.

Our focal areas align with the prevailing needs and challenges within Bhutan and beyond. We grasp the intricate connections between forestry practices, species preservation, and broader ecological dynamics. We also delve into the ramifications of land utilization and global climate shifts on water supplies and energy demands. Most importantly, we scrutinize the reciprocal impacts of human activities and policies on both ecosystems and society, examining social and economic dimensions.

UWIFoRT goes beyond research, offering a comprehensive one-year certificate program in environment, forestry, and conservation. Tailored courses are designed for professionals in fields like conservation biology, sustainable forestry, and water resources. To foster discourse, we frequently organize seminars and host conferences at national and international levels.

Operational within the Department of Forests and Park Services under the Ministry of Energy and Natural Resources, UWIFoRT can be reached at Tel: +975-3-631926/631924 or via email: info@uwice.gov.bt.

Further information is available on our website: www.uwicer.gov.bt

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