

International Winter School
“Biodiversity, Ethnoecology and Bioprospecting in Nepal Himalaya”

January 29 – February 8, 2018 Kathmandu, Nepal

Organizers;

Research Centre for Applied Science and Technology (RECAST), Tribhuvan University,
Kirtipur, Nepal

Department of Agronomy, Food, Natural resources, Animals and Environment (DAFNAE),
University of Padova, Italy

Course details

The course will be open to the graduate students of life sciences from all over the world thus providing a unique opportunity to the students to learn contemporary issues in Nepal in the areas of biodiversity and environmental management, cross-cultural learning and strengthen capacities of both countries institutions. Students will have an opportunity to enhance their knowledge by visiting some world cultural heritage sites in Kathmandu. In addition, the students will travel to *Panchase* village, a typical Gurung village at mid hills in adjoining area of Pokhara to conduct their individual/group as well as field research works within a broad framework of environmental management, and prepare scientific reports. The participants will also have opportunity to interact with ethnic Gurung people to know their culture and tradition. They can also see the panoramic view of Mount Annapurnana range, green mountains, Phewa Lake and Pokhara valley.

Total hours spend to complete the course will be about 110 hrs which should be adequate for fulfilling the requirements of 5 ECTS (European Credit Transfer System).

The main objective of this International Winter School is to acquaint the students with contemporary issues of biodiversity, ethnoecology and bioprospecting in Nepal Himalaya; expose them to the sustainable use of biodiversity; and understand indigenous peoples’ and local communities (IPLCs) role and contribution to manage the natural resources; and cross-cultural learning.

The course will include four thematic areas:

- (1) Environment and Biodiversity Conservation
- (2) Ethnobiology and Community Development
- (3) Bioprospecting and Drug Discovery
- (4) Natural Resource Management and Sustainable Development

1. Environment and Biodiversity Conservation

Course title: Environment and Biodiversity Conservation

Total ECTS: 0.5

Course no: BEB 501

Nature of course: lecture, practicum/exercise and assignment

Working hours: 12

Topics/titles to be covered under Environment and biodiversity

4.1. *Biodiversity conservation in Nepal Himalaya from conservation and development perspectives.* Coverage under this lecture/topic includes: Biodiversity Concept, Status of biodiversity and medicinal plants, Biodiversity and ecosystem resilience, Peoples’ dependence

on biodiversity, Leading threats and causes of biodiversity & Key Challenges, Consequences of deforestation in Nepal, Conservation efforts and achievements, Linking biodiversity and Poverty, Way forward and Conclusions. (**Ram P. Chaudhary**)

Practicum/Exercise under this topic we will discuss: Why should we conserve biodiversity in Nepal Himalaya?; What, exactly, should we be conserving?; How should we conserve biodiversity? (**Ram P. Chaudhary and Khadga Basnet Bhandari**)

4.2. *The role of ecosystem services in socio-ecological resilience: A retrospective from the Himalayas.* Coverage under this lecture includes: Evolving concept of Ecosystem services and socio-ecological resilience, urgency of recognizing state and dynamics of ecosystems and its services and need for better understanding of ecosystem services and human wellbeing in socio-ecological system thinking (**Nakul Chettri**)

Practicum/Exercise: This is an interactive session with definition of ecosystem services and socio-ecological resilience in mountain perspective and explain how biophysical entities and socio-economic perspectives are linked. We will try to rationalize the importance of mountain ecosystem for continuous flow of ecosystem services and contribution to socio-ecological resilience in changing scenarios. (**Nakul Chettri and Prabin Bhadari**)

4.3. *Propagation by clonal methods based in plant tissue culture: some applicative examples for biodiversity conservation.* Coverage under this lecture/topic includes: An overview of *in-vivo* and *in-vitro* plant culture methods and examples of their application will be given. Classical horticultural methods of clonal propagation (cuttings, bulbs, rhizomes etc) and improved methods of plant cell and tissue cultures (micro-propagation, callus and cell suspension cultures, protoplast culture, somatic embryogenesis) will be described and discussed. These procedures have become versatile tools for basic scientific research as well as for application in agriculture, forestry and have also simplified the storage and conservation of germplasm. (**Barbara Baldan**)

Practicum/Exercise: We will discuss application of clonal propagation and tissue culture in conserving agriculture and forest genetic resources with its prospects in the Himalayas. (**Barbara Baldan and Bijay Subedee**)

4.4. *Protected areas in Nepal – Conservation and sustainable development.* Coverage under this lecture/topic includes: Protected Areas (PAs) management system and development trend, PA management activities, International treaties and conventions, Local communities in PA management, Transboundary cooperation, Wildlife crime conditions, Research monitoring, Way forward. (**Maheshwar Dhakal**)

Practicum/Exercise under this topic we will discuss on: Role of PAs in conservation of biodiversity, Contribution of communities to PAs management in Nepal Himalayas and abroad, we will try to answer how to reconcile PAs management and development. (**Maheshwar Dhakal and Chandra K. Subedi**)

2. Ethnobiology and Community Development

Course title: Ethnobiology and Community Development Total ECTS: 0.5

Course no: BEB 502

Nature of course: lecture, practicum/exercise and assignment Working hours: 12

Topics/titles to be covered under Ethnobiology and Community Development

2.1. *Introduction to Ethnobiology: Review of Ethnobiology Research in Nepal.* Coverage under this lecture includes: Introduction, Ethnobiological research, Review of ethnobotanical research on ethnic groups of Nepal; ethnobotanical data vs. bioassay of potential species, conclusion and recommendations. (**Krishna K. Shrestha**)

Practicum/Exercise under this topic will discuss on: Preparation of concept note (or pre-proposal) on validation of ethnobotanical data by using modern techniques. (**Krishna K. Shrestha and Kamal Mohan Ghimire**)

2.2. *Ethnobotany of Nepal: Trends and Perspectives.* Coverage under this lecture includes: History and current trends of ethnobotanical research in Nepal, special focus will be made on research done on medicinal plants and other areas by ethnic community from the past to present, lesson learnt and future perspective. (**Sangeeta Rajbhandary**)

Practicum/Exercise under this topic will discuss on: Will go through papers related with some of the important work done on different field by different ethnic community and analyze their work for the preparation of concept note for the ethnobotanical study to answer the question as: Why ethnobotanical study is needed for community development? (**Sangeeta Rajbhandary and Bijay Subedee**)

2.3. *Traditional knowledge, Access to genetic resources and Benefit sharing.* Coverage under this lecture includes: Concept of Traditional Ecological Knowledge (TEK), Access to genetic resources and benefit sharing (ABS) and Intellectual Property Rights (IPRs); Issues related to TEK, ABS and IPRs; Benefit sharing models; Ethnobotany and drug discovery; ABS from developing countries perspective; conclusions. (**Yadav Uprety and Ram P. Chaudhary**)

Practicum/Exercise: We will discuss on: What is fair and equitable benefit sharing? How and to whom the benefits should be distributed in a fair and equitable way? And what are the international regimes on ABS? (**Yadav Uprety and Ram P. Chaudhary**)

2.4. *Integrating Ethnoecological Knowledge in Conservation Biological Approaches.* Coverage under this lecture includes: Ethnoecology, theoretical advancement, research approaches, levels and modes of studies, link to science, issues and case studies. (**Suresh K. Ghimire**)

Practicum/Exercise under this topic will discuss on: Why and how to integrate and apply ethnoecological knowledge and practices to biodiversity conservation (**Suresh K. Ghimire and Chandra K. Subedi**)

3. Bioprospecting and Drug Discovery

Course title: Bioprospecting and Drug Discovery

Total ECTS: 0.5

Course no: BEB 503

Nature of course: lecture, practicum/exercise and assignment

Working hours: 12

Topics/titles to be covered under Bioprospecting and Drug Discovery

3.1. *Traditional medical knowledge, bioprospecting and value chain.* Coverage under this lecture includes: General view of traditional medicine and medical practice in Nepal and the use of the knowledge to develop value added products. (**Meena Rajbhandari**)

Practicum/Exercise under this topic will discuss on: What is traditional and indigenous medicine and medical knowledge? Why Nepal's indigenous medical knowledge is under threat? How to preserve indigenous medical knowledge for intellectual property right? How to integrate traditional and modern medicine? (**Meena Rajbhandari and Gan B. Bajracharya/Sajan L. Syaula**)

3.2. *Bioprospecting and drug discovery -The new approaches in the study of bioactive natural products.* Coverage under this lecture/topic includes: Overview of methods for extraction, characterization and identification of bioactive constituents in plant materials. In particular chromatographic techniques will be considered and hyphenation with spectroscopic methods. Identification of new chemical entities from plants by mass spectrometry and Nuclear Magnetic Resonance experiments. The use of metabolomics based approaches will be discussed with attention to medicinal plant bioactivity and composition. All the new analytical and methodological aspect in the study of medicinal plants will be discussed. These tools will be useful for scientific research in the field of natural products being related both to agriculture, crop science and pharmaceutical scientist. (**Stefano Dall'Acqua**)

Practicum/Exercise: We will discuss new approaches in the study of bioactive natural products, prospects and challenges of new approaches for research and development (R&D). (**Stefano Dall'Acqua and Girija Mani Aryal/MR**)

4.3. *Instrumental methods in Drug discovery.* Coverage under this lecture includes: Basic principles, instrumentation, and spectral analysis. (**Sajan Lal Syaula**)

Practicum/Exercise under this topic will discuss on: General instrumental methods for the analysis and identification of natural products. (**Sajan Lal Syaula and Meena Rajbhandari/Gan B. Bajracharya**)

3.4. *Methods of Natural Products Analysis and Synthesis.* Coverage under this lecture includes: Screening of natural products constituents, extraction, separation, purification, identification tools. Bioassays techniques. Retrosynthetic analysis. Examples of synthetic routes for the total synthesis and derivatizations of some naturally important molecules. (**Gana B Bajracharya**)

Practicum/Exercise under this topic will discuss on: (a) How to work in the field of natural product research, (b) General ideas for bioassays, (c) What are the tools and techniques in organic synthesis. (**Gana B Bajracharya and Sajan L. Syaula/ Meena Rajbhandari**)

4. Natural Resource Management and Sustainable Development

Course title: Natural Resource Management and Sustainable Development Total ECTS: 0.5

Course no: BEB 504

Nature of course: lecture, practicum/exercise and assignment

Working hours: 12

Topics/titles to be covered under Natural Resource Management and Sustainable Development

4.1. *Exploitation of diversity within crops: from genetic resources to agrobiodiversity.* Coverage under this lecture includes: Coverage under this lecture includes: the concepts of biodiversity, agrobiodiversity and genetic diversity will be defined and discussed. The effects of domestication, artificial selection, plant breeding and biotechnologies as well as climate changes on biodiversity and genetic diversity will be analyzed and discussed. An overview on genetic resources characterization and conservation will be given. The importance of agrobiodiversity for a more sustainable agriculture will be emphasized. (**Serena Varotto**)

Practicum/Exercise under this topic will discuss on: Genetic resources (GR) in Nepal; Problems and prospects of conservation of GR; Communities role in preserving GR (**Kamal Aryal and Serena Varotto**). Kamal Aryal will make a brief presentation) for about 15-20 minutes) before interacting to the students.

4.2. *Wildlife Conservation and Human-wildlife conflicts: Examples from Nepal.* Coverage under this lecture includes: HWC overview - human wildlife relationship, causes and consequences, mitigation measures and effectiveness, case studies. (**Khadga Basnet**)

Practicum/Exercise under this topic will discuss on: explore HWC from regional, continental, and global perspectives (where possible) particularly focusing on similar/dissimilar cases and their action programs. This will lead to figure out what worked out and what did not. Then it will generate a list of successful programs (research and action activities) that are implementable in the Himalayan region! This practical will be conducted in such a way that everyone in the group will be involved and the results will be communicated through 3 rapid presentations of 2-3 minutes each. (**Khadga Basnet and Min B. Gurung**)

4.3. *Prospects of Renewable Energy in Nepal and Water Issues.* Coverage under this lecture includes: Energy Access and Energy Poverty in Nepal, Renewable Energy Resources of Nepal / Potential Biomass Energy, Improved Cooking Stoves, Biomass Briquetting, Biogas, Biofuel, Hydropower micro-hydropower, Improved Water Mills, Solar Energy, Solar Dryer, Solar cookers, Solar Photovoltaic System, Wind Energy, Geothermal Energy, Renewable Energy Policy/Clean cooking Solution for All Water Issues, General Issues, Hydropower Issues, Water Supply and Sanitation Issues, Social Issues, Environmental Issues, Institutional Issues, Irrigation Issues, International Issues, Conclusion, Way Forward. (**Krishna Raj Shrestha**)

Practicum/Exercise: What are kinds and sources of energy in Nepal? What are the potential of energy sector in Nepal? What are the problems/challenges of development of energy sector? Discussion on political ecology of energy sector. (**Krishna Raj Shrestha and Rajib Thakur**)

4.4. *Community Forest Management, Governance and Gender.* Coverage under this lecture includes: Concept of Gender, Social define gender role, Gender and conservation, Indigenous people, Conservation and climate change in reference of Gender, Definition of Governance and

community forestry, Historical background of Governance, Example of Governance, Population growth and natural resources. (**Sajani Shrestha/Shyamu Thapa Magar/Sushla Nepali**)

Practicum/Exercise under this topic will discuss on: What is the gender difference in Nepalese society? What we need to improve for conservation of nature? Do the indigenous people conserve natural resources conservation? Why we need good governance? How we can develop the good governance? (**Sajani Shrestha/Shyamu Thapa Magar/Sushla Nepali**)

(v) Observation on Environmental issues

Course title: Observation on Environmental issues Total ECTS: 0.5

Course no: BEB 505

Nature of course: Observation and presentation

Working hours: 12

Under this course students will be assigned to observe the environmental issues such as solid wastes, pollution, forest management, river management etc. along the highway and surrounding area from Kathmandu and Pokhara and visiting places in Pokhara. Students will try to understand the root causes of environmental issues. *A report will be submitted by each student for evaluation.*

(vi) Field Work

Course title: Field work

Total ECTS: 1.5

Course no: BEB 506

Nature of course: Field work and data collection

Working hours: 30

(vii) Research report

Course title: Research report

Total ECTS: 1

Course no: BEB 507

Nature of course: Research report preparation and presentation

Working hours: 20

(P.S.: Some changes that would be made in the programme will be informed on time)