



Mahidol University
International College

ICBI 263 Practical Sustainability and Biodiversity 4 (2-4-6)

Course Coordinator	Dr Wayne Phillips	Class time	
Classroom		Contact:	wayne.phil@mahidol.ac.th
Office hours	Anytime by appointment	Google Classroom Code:	

There are two kinds of people in the world.

1. *Those who can extrapolate from incomplete data*

Anon.

“The connections between causes and effects are often much more subtle and complex than we with our rough and ready understanding of the physical world might naturally suppose”

Dirk Gently In **Dirk Gently’s Holistic Detective Agency** by Douglas Adams

Course Goals

This course will enable you to design and execute appropriate field sampling strategies, and to critically analyse and interpret ecological information, collated from the academic literature and collected in the field, to explain the complex interactions between drivers of change and their impacts on ecosystems, biodiversity, and human populations. Through hands-on data collection activities you will be able to compare and contrast key biodiversity and sustainability challenges specific to different tropical ecosystems to propose evidence-based conservation and sustainability solutions. In addition, the course aims to foster ethical and responsible behaviours by emphasising environmental safety and the minimisation of ecological impact.

Course Objectives

1. Formulate testable research questions and hypotheses based on reviews of biodiversity and sustainability literature
2. Evaluate different sampling methods and techniques for static and mobile organisms
3. Evaluate the objective collection, analysis and interpretation of ecological information from diverse tropical ecosystems to inform evidence-based conservation strategies.
4. Exercise intellectual curiosity, critical thinking and independent learning

Course Learning Outcomes:

By the end of the course, you will be able to

1. *Analyse environmental drivers* Evaluate how human, climate, and geological changes affect ecosystems at different scales (local, national, regional, and global).
2. *Synthesise data and draw conclusions* Interpret and combine data collected in the field, and from various scientific sources to create well-supported conclusions about ecological, environmental, and socioeconomic changes.
3. *Communicate findings clearly* Explain complex environmental relationships and propose evidence-based conservation strategies using proper scientific language and data visualisations.
4. *Demonstrate ethical field practices* Work safely and professionally in the field while minimising your impact on the environment.

Course Description



Exploration of sustainability and biodiversity through hands-on fieldwork and research; review sustainability and biodiversity literature, develop research questions, and design investigations focused on real-world environmental challenges; assessing and conserving biodiversity across various ecosystems; sampling strategies; field work included

Credit hours per trimester

Lecture (hrs)	field work (hrs)	Self-study (hrs)
24	48	72

Unit One Urban Ecosystems - *Green Heart and resource flows*

Theoretical focus - Establishes the interrelationship between ecology, conservation, and sustainability using the complex urban environment of Bangkok as a core case study. We cover (i) Green infrastructure and urban metabolism, (ii) the conflict between conservation and development, and (iii) the transition to a circular economy for waste, followed by practical training in urban assessment methods.

Field immersion - Comparative study across three distinct urban models: The conserved ecosystem of Bang Krachao (biodiversity transects, water quality), the engineered model of Dusit Central Park SkyPark (Urban Heat Island check, Resource Efficiency Analysis), and the community-based practices at Baan Saladin Creative Industry Village (Local Materials/Waste Chain Tally).

Data synthesis - Workshop focused on contrasting findings from the three sites to link diverse urban models back to the core themes of ecology, conservation, and sustainability.

Unit Two Landscape ecology - *the conflict gradient*

Theoretical focus - Understanding how large-scale human interventions (like dam construction and land-use) fundamentally re-engineer local ecology, creating a chain reaction of habitat disruption. We focus on headwater streams as “ecosystem sentinels”, and the drivers of human-wildlife conflict involving large-ranging species.

Field immersion - Contrasting the scale of impact across three sites: Sai Yok Noi Stream (water quality audits, stream velocity to quantify micro-impacts), OurLand Wildlife Reserve (designing Human-Elephant Conflict mitigation plans to address forest fragmentation), and Khao Nam Pu (analysing Banteng reintroduction success and participating in habitat restoration through native seeding).

Data synthesis - Structured data workshop to aggregate and contrast ecological findings, requiring synthesis of specific data across all locations to support conclusions on conceptual relationships.

Unit Three Coastal interdependence - *source to sink*

Theoretical focus - Integrating local coastal ecology with global Sustainable Development Goals (SDGs). We analyse estuaries and mangroves as critical functional areas, trace urban and industrial pollution gradients to plastic debris sources, and discuss coastal connectivity and how mangroves protect coral reefs. All observations are framed within SDG 14 (Life Below Water).

Field immersion - Activities designed to connect local function with global goals: Quantifying mangrove function and assessing sustainable fisheries via a Livelihood Audit. Categorising plastic debris and scoring degradation at a pollution hotspot. Concluding at the coral reef with live coral cover surveys and fish diversity counts to quantify the impact of land-based pollution and tourism impacts.

Data synthesis - Final post-field workshop designed to tie together the complex coastal data, linking upstream pollution issues to downstream consequences on the reef, and framing the entire system within global sustainability targets.

Unit Four Climate change, biodiversity, and sustainable futures in Southeast Asia



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Focus - Synthesis of site-specific data and transition to integrated, regional solutions. We analyse one dominant climate driver (coastal flooding) that simultaneously threatens all three ecosystems (urban, inland, coast). We introduce the framework of Nature-Based Solutions (NbS), contrasting "grey" and "green" options, and discuss methods for prioritising conservation investment.

Unit Five Integrated Adaptation Strategy presentation.

As an environmental consultant you will select one major regional sustainability challenge to propose a unified, evidence-based strategy to address it. The core requirement is to design an interconnected network of three Nature-Based Solutions (NbS) - one for each field location - and synthesise the justification for each action using quantitative field data collected across the entire course. The final proposal must also clearly analyse the ethical, social, and economic viability of the strategy.

Assessment and evaluation

Mahidol University Artificial Intelligence (AI) Assessment Scale

Mahidol University encourages you to use AI tools to enhance your learning and to foster creativity. However, you must integrate your own thinking and insights into your assessed work and not simply copy and paste AI-generated content and pass it off as your own - this is academic dishonesty, and is **not acceptable**.

The appropriate use of AI in your assessed work is determined by your instructor according to the following scale:

Level	Meaning	Description
1	No AI	The assessed work is completed entirely without AI assistance in a controlled environment. Students rely solely on their existing knowledge, understanding, and skills.
2	AI Planning	AI is used for pre-task activities like brainstorming, outlining, and initial research. The focus is on using AI effectively for planning, synthesis, and ideation, while students independently refine and develop ideas.
3	AI collaboration	AI is used to assist in completing tasks, including idea generation, drafting, feedback, and refinement. Students critically evaluate and modify AI outputs to demonstrate understanding.
4	Full AI	AI can be extensively used to complete tasks, with students directing AI to achieve assessment goals. Critical thinking and engagement with AI for problem-solving are essential.
5	AI exploration	AI is employed creatively to solve tasks, generate novel insights, or explore innovative solutions.

Mahidol University Student Acknowledgement of AI Use statement

For any coursework that permits the use of AI (see below), you must complete an **AI Acknowledgment Statement** when submitting your work. Failure to complete this statement where AI has been used will be considered academic dishonesty. You will be asked to acknowledge what AI tools you used and to what extent you used them in the completion of your assessed work. The following form will be used:

I acknowledge the use of [inset AI tool used] in this work

I used the AI tool for the following reasons: (please check all that apply)

- | | |
|--|---|
| ☐ Generate ideas, outline, and for initial research | ☐ Generate visual or multimedia elements |
| ☐ Data analysis and visualisation | ☐ Customise content formatting |
| ☐ Language and grammar assistance | ☐ Create music, sound effects, or other audio elements |
| ☐ Programming and coding | ☐ Generate citations or bibliographies |
| ☐ Design graphics, layouts, or presentations with AI design tools | ☐ Others (please specify)
..... |

Grading Rubric

Your final grade will be based on the following components. For a complete breakdown of the grading criteria and rubric for each component, click on the headings below:

Integrated synthesis challenge [45%]

AI Assessment Scale: Level 1

This individual assessment requires you to synthesise specific field data from at least two different locations to analyse a systemic conflict and propose a targeted, evidence-based solution. It assesses your ability to analyse complexity and communicate findings professionally.

Group Presentation [35%]

AI Assessment Scale: Level 2

This substantial group project assesses your ability to collaboratively design a comprehensive Nature-Based Solution (NbS) network that addresses a major climate driver by linking all three field sites (Urban, Inland, Coast). You are graded on the clarity of your proposal and the justified use of quantitative field evidence.

Daily Field Reflection Log [10%]

AI Assessment Scale: Level 1

A personal, ongoing assessment during field visits. Its main purpose is to encourage you to reflect on your immediate subjective experiences, connect in-field discussions to theoretical concepts, and document the methodological choices we make.

Professional Contribution [10%]

AI Assessment Scale: Not applicable

This peer evaluation assesses your effectiveness as a consultant, specifically evaluating your quality of contribution, collaboration, and adherence to field ethics and communication standards.

Assessment & CLO alignment

Your final grade will be based on a combination of individual work, group project, and continuous learning. Each component is designed to assess your progress toward the Course Learning Outcomes, and the weighting reflects the importance of each component.

Course Learning Outcome	Integrated synthesis challenge	Group Presentation	Daily Field Reflection Log	Professional Contribution¹	Total Contribution to Final Grade
Analyse Environmental Drivers	13.50%	12.25%	3.50%	4.00%	33.25%
Synthesise Data & Draw Conclusions	18.00%	12.25%	2.50%	2.50%	35.25%
Communicate Findings Clearly	6.75%	5.25%	1.50%	2.50%	16.00%
Demonstrate Ethical Field Practices	6.75%	5.25%	2.50%	1.00%	15.50%
Contribution to final grade (weighting)	45%	35%	10%	10%	100%

¹ Peer evaluation takes place after the last class.



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