Directed Research
SFS 4910

Syllabus
4 Credits

Faculty
Dr. Megan English
Dr. Tim Frewer
Dr. Jean-Christophe Diepart

Office hours by appointment

The School for Field Studies (SFS)
Center for Environmental Justice and Mekong Ecologies

This syllabus may develop or change or time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.
Center Research Direction
The Centre for Conservation and Development Studies is developing their research foci under three themes. These are in an ongoing period of review and extrapolation as the Strategic Research Plan is adjusting for the Centre with new faculty since the Covid hiatus. The directed research projects being undertaken this semester play a key role as scoping studies within these themes to refine the research direction and maximize the research output of the Centre.

Biodiversity Conservation and Ecology
This theme includes research topics such as:
1. Aquatic ecology and conservation
2. Terrestrial ecology
3. Ethology

Environmental Governance and Natural Resource Management
This theme examines the interactions between social and environmental factors in environmental conservation and development and includes research topics such as:
1. Community-based resources management
2. Waste and urban ecology

The Human Environment Nexus
Research topics under this theme explore the relationship between communities and their environment such as:
1. Agroecological transition
2. Certification system and value-chain analysis
3. Livelihood diversification and transformation

Course Overview
The aim of this course is to provide students with the opportunity to apply ecological, biological, and/or social scientific methods to a field research project that addresses a local issue related to the environment. This course prepares students to distinguish hidden assumptions in scientific approaches. We will also investigate the ways that various methods and theories distinguish (or do not) fact from interpretation, cause from correlation, and advocacy from objectivity. The Directed Research topics are driven by needs and interests of local stakeholders, partners, and friends of SFS in the Mekong region. Through the directed research projects, students will contribute to a growing body of scientific research that informs local conservation and resource management decisions.

Each student will join a faculty-led team that will carry out field research, data analysis, and communication of results in one or across several of the following disciplines: ecology, natural resource management, livelihoods, and environmental ethics. The Directed Research course is designed to build on the information students have learned in the Ecosystems and Livelihoods, Conservation Science and Practice, and Environmental Ethics and Development courses as well as
Directed Research lectures and workshops specifically designed to assist students in understanding the scientific process, testing hypotheses and presenting results in both written and spoken formats.

The research projects being conducted this semester will be elaborated and introduced to students by the faculty as the semester progresses.

**Learning Objectives**
The core skills students will learn in this course are field techniques, analytical methods, skills, and critical thinking, as well as teamwork, and time management. The specific objectives of the course are:

1. Understand the process of designing a field research project
2. Conduct field sampling
3. Manage, interpret, and analyze data sets
4. Communicate research results to diverse audiences
5. Manage teamwork within the context of collaborative research

**Assessment**
You will present your DR projects in the standard scientific formats of a peer-review style report and a conference style presentation. You will also be graded on your data management and your positive contribution to the class. Comprehensive details of all assignments will be provided separately, see below for the general descriptions and expectations.

<table>
<thead>
<tr>
<th>Assessment Item</th>
<th>Value (%)</th>
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<tbody>
<tr>
<td>Project Proposal</td>
<td>10</td>
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<tr>
<td>Final Report</td>
<td>40</td>
</tr>
<tr>
<td>Presentation</td>
<td>20</td>
</tr>
<tr>
<td>Data Management</td>
<td>10</td>
</tr>
<tr>
<td>Directed Research Skills</td>
<td>20</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
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**Project Proposal (10%)**
The project proposal component has three elements: a project proposal/research protocol which must be submitted but is ungraded, a draft of introduction and methods and a draft of results and report outline.

1. **Project Proposal/Research Protocol**
Each DR supervisor will work with students to prepare a brief DR project proposal setting out what each student intends to investigate and what general methods will employed and, depending on the form of the project, a research protocol that incorporates a topic guide.

2. **Draft Introduction and Methods**
The draft introduction should be developed after reviewing relevant literature. One day is allocated for students to undertake a literature review. The main objective of the literature review is for students to familiarize themselves with previous research and publications in the area of their
chosen Directed Research project. The introduction should draw upon a literature base (where possible) to firstly review the current status of research in the field and then to build a setting and justification for research that still remains to be done. The draft introduction should then establish the aims and objectives of the research.

3. Draft of Results/Report Outline
The main objective of the Report Outline is for students to provide a full draft of the results section and detailed framework of their discussion for feedback. It must include the draft introduction and methods sections along with a draft results section and a draft or an outline of the discussion findings.

Final Report (40%)
The final report is written in the style of a peer-review submission to a journal in the appropriate field. You will have ample opportunity for guidance from your DR supervisors throughout the DR period and especially during DR data analysis week. The analytical tools for research classes in the DR course (and complementary classes in other courses) are designed to prepare you for producing the Results section and improve the quality of your work.

Presentation (20%)
You will present a subset of your DR work in a conference style presentation of 15 minute length with additional time for questions. Unless the scope of your DR project is very small, you should not attempt to include everything from your final report into this presentation. Making sure that you are within the allotted time is a very important skill and thorough rehearsal is important.

Data Management (10%)
It is important to record and store research data in a manner that is useful. You will need to provide (as applicable) Excel sheets, interview transcripts, and coding families with your research data in a format that is intelligible to someone else. You may need to provide both raw and manipulated data you used to create figures, tables and to run statistical tests. You need to annotate your spreadsheets (use text boxes if appropriate) so that an outsider can understand what the data are. You may be required to provide field notes on your findings for review.

Directed Research Skills (20%)
Your Directed Research Skills will be graded throughout the DR course by your supervisor. Your final grade will depend upon your attendance to all DR activities, active involvement and competencies in field data collection, data interpretation and group participation/support.

Projects
The research projects being conducted this semester are the following: (as we are filling this in in hindsight we have just added the Abstracts to the below section for this semester)

1. Project Supervisor: Dr Megan English
Watersnakes in the Tonlé Sap: Perceptions of Bycatch and Trade in the Late Dry Season in the Kampong Khleang Commune

Freshwater snakes are some of the most understudied reptiles in the world, especially in Southeast Asia. The Tonlé Sap lake is home to the world’s largest water snake harvest annually, but the harvest is unmonitored and information about the local water snake populations is severely lacking. This study was conducted as a follow up to a 2019 study concerned with watersnakes as fishing bycatch conducted in Cambodia’s receding season. We assessed the quantity, size, and composition of watersnakes caught as bycatch by examining individuals from fishermen’s lop traps and sold by a snake trader for seven days in Kampong Khleang Commune in April 2023. The most common species we found was *Acrochordus granulatus*, commonly known as the File Snake, but this snake was not perceived to be at risk of exploitation during the dry season because it was unanimously released. Our data revealed that there is a seasonal variation in snake populations and species caught as bycatch between the receding and late dry season. We conducted 31 semi-structured interviews with local fisherpeople to understand local perceptions of the water snake trade during the late dry season, when water snakes are less prevalent. The results found that finding water snake species as bycatch, or for sale in markets, is becoming increasingly difficult for local people, claiming this is due to anthropogenic factors such as fire and habitat loss. Interviews revealed that while species diversity remains the same, the quantity of snakes they see as bycatch has decreased over the years, suggesting that conservation action is needed. We suggest further research into the seasonality of watersnake threats, as our research suggests that while bycatch is the main threat to snakes in the wet and receding season, fires and habitat loss are the main threat in the late dry season. We also suggest a repetition of this study in the receding season of 2023 to adequately determine if the endemic and Vulnerable species, *Enhydris Longicauda*, is again the most abundant bycatch as it was in 2019.

Fish abundance, diversity, morphology, and diets in Kampong Khleang Commune, Tonle Sap Lake, Cambodia

The Tonle Sap is the largest lake in Southeast Asia, supporting livelihoods across Cambodia and being a crucial part of its people’s history. Fed by the Mekong River, the water entering the Tonle Sap originates from several Asian countries and contains nutrient-rich sediment as well as many migratory fish species. These factors make the Tonle Sap extremely productive, feeding over a million people through fishing and farming along the lake’s edge. As human exploitation of the lake increases, the natural balance of the lake ecosystem becomes threatened. To assess the impact of these threats, this research assessed fish diversity, abundance, morphology, and diet. This information was gathered from a local fisherman who supplied fish that were identified, weighed and measured. This study, in the late dry season, was based on two previous studies conducted in the late wet season of 2014 and 2019 and assessed similar factors with slight variation in methodologies. By comparing these studies to the current findings, noticeable changes were observed. Daily average abundance increased to 827 fish a day in a time when fish stocks should be at their lowest. Species diversity on the other hand declined from 60 species in 2014 to 49 in 2023. There was a common theme among mouth position, body type, and tail type that allowed for quick swimming across long distances in open water. Since the previous studies, the abundance of fish in different dietary groups has changed with the majority of the catch being omnivores instead of algaevores. Further research is necessary to understand the exact reasoning behind such changes yet crackdowns on illegal fishing in recent years, decreased presence of piscivorous fish, and changes in food availability are possible.
Asian elephants (*Elephas maximus*) are critical ecological engineers and a keystone species in Southeast Asia that are vital to the health and functioning success of their ecosystem. Yet, their populations are declining due to habitat fragmentation, deforestation, and poaching, leading to increased human-elephant conflicts. Further understanding Asian elephants’ ecological and behavioral trends has led to necessary conservation efforts that protect this species across their geographical ranges. Despite this, a significant lack of research has been conducted in Cambodia regarding Asian elephants. In this study, we analyzed the foraging behavior and activity budget of six semi-captive Asian elephants in Kulen Elephant Forest, located in Siem Reap, Cambodia. The aim of this study was to evaluate significant trends in their activities and flora consumption in comparison to a similar study conducted in the late wet season, as well as contribute information to gain a greater universal understanding of this species. Data was collected over a period of nine days, typically from 10am-12pm using systematic sampling every two minutes, with a total of 941 data points collated. The most frequent activities measured in this study, the late dry season, included food preparation (38.1%), walking (17.5%), and feeding (14.9%). Compared to the late wet season, their top three most frequent activities recorded were walking (26.5%), food preparation (21.2%), and environmental exploration (19.2%). Out of the twelve independent variables measured, five were statistically correlated with elephant activity: Focal Elephant, Habitat Type, Mahout Command, Mahout Distance, and Canopy Cover. Out of 115 records of feeding, the elephants consumed 50 different plant species within 29 plant families. The focal elephants favored Arecaceae (29.8%) and Moraceae (16.7%) families in this study, but Poaceae (27.3%) and Fabaceae (28%) families in the previous study. Across seasons, vines and grasses were consumed the most out of any other plant form, with a preference for leaves in nearly half of all instances of feeding. The findings of this study will contribute insight for future conservation efforts in Cambodia and present feasible operational improvements at elephant sanctuaries or zoos to enhance the welfare conditions for their elephants.
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2. Project Supervisor: Dr Tim Frewer

A Female Focused Study of the Precarious Position of Urban Recyclers in Siem Reap, Cambodia

Due to the influx of consumer goods from advanced capitalist economies over the last few decades, Southeast Asian countries have been affronted with massive amounts of aluminum cans, plastic bottles and cardboard. With no pre-existing, formal recycling structure, management of recyclable waste has become the responsibility of the informal sector. Driven to informal work due to slow job growth, historical or economic limitations to educational attainment, a lack of capital, physical or mental disability, landlessness, or disproportionate domestic burden, these urban recyclers play a crucial role by returning value to discarded material while cleaning up urban environments and contributing to sustainable waste management. The waste pickers, waste buyers, and depot owners and employees who make up this commodity chain are rarely given the respect they deserve from community peers, academia, or authorities. This lack of information has prevented proper reformative action to be taken, and so this project aims to map the economic vulnerability and marginalization of urban recyclers. Building off previous work conducted last year, this paper outlines the causal factors that push individuals into the informal sector or a survivalist livelihood, with a special focus on the incidence of landlessness and the gendered distribution of domestic burden.

Small Scale fisher-people, Markets and Environmental Degradation on the Tonle Sap

The Tonle Sap is known as one of the most productive inland fisheries in the world, producing about 300,000 tons of fish annually and feeding 1.5 million people. Consequently, the great lake is central to people’s livelihoods and food security which makes riparian communities highly dependent on the ecological health of the lake. However, environmental degradation and declining fish yields per person have been occurring in the last few decades due to climate change and overexploitation. Fishing as a livelihood inherently relies on catching fish to sell, but it is becoming progressively harder to catch the same yield per unit of effort as before. This study works to examine how capitalist markets have had a direct impact on small-scale fishers as they must compete amongst
larger-scale competitors and each other. We hypothesized that marketization has led to a depletion of the fishery’s resources, and a precarious situation for asset-poor fishers as they have had to switch from mostly subsistence fishing to commercial fishing in a market that is constantly subject to fluctuations. This study interviewed 35 participants in a series of detailed semi-structured interviews across two communes on the Tonle Sap: Kampong Kleang and Chong Kneas. Additionally, 9 trader surveys were distributed at fish markets and a group forum was organized among community fishery members in Kampong Kleang. Results from qualitative data indicate that the majority of small-scale fishers (1) do not receive an income sufficient to support their families; (2) are becoming increasingly indebted; (3) have had to shift to industrialized gear that is often illegal; (4) have seen a decline in their fish yields despite increased efforts; and (5) face market price fluctuations and a recent trend of declining fish prices. As a demographic that lacks mobility and livelihood alternatives, small-scale fishers on the Tonle Sap are the most threatened by environmental changes, structural inequalities, and competition.

3. Project Supervisor: Dr Jean-Christophe Diepart

Changing Livelihood Diversification along the Tonle Sap Lake: The Case Study of Kampong Khleang Commune

Communities reliant on natural resources are constantly adjusting to changes in their environment. This research looks at the patterns of livelihood diversification in Kampong Khleang in reference to the evolution of Tonle Sap resource management since 2000. The Kampong Khleang commune is located on the Lake and is reliant on its ecosystem services for subsistence and income. Families whose livelihood depends on it, have been impacted by the evolution of the Lake’s resource management system; it is because of this trajectory that access to wetland and flooded forest resources have fluctuated, creating new patterns of livelihood diversification. Through a series of qualitative research interviews and one group discussion, past and current trends of demography, politics, and economics reveal how different livelihood strategies have been established in the area. A typology of such strategies was created from this data, in relation to household wealth classifications, to explain the differentiation of families within the commune. Findings unearth an increasing dependency of wage labor and rising accumulation of debt within the villages of Ta Uor Sa and Ou Ta Puk.

Participatory Guarantee Systems in Cambodia: Learning from the experience of smallholder farmers in the ECOFARM cooperative in Siem Reap province

Organic agriculture was developed in the second half of the 20th century in response to the growing concern surrounding the negative impacts of conventional agriculture on human health and the environment. One of the most heavily criticized components of the organic industry is the third-party certification (TPC), which is expensive and excludes smallholder farmers. Participatory Guarantee Systems (PGS) provide an alternative to TPC by allowing smallholder farmers to come together for a peer-to-peer certification process. The Participatory Guarantee System allows for farmers to gain benefits they may have not received previously while producing sustainable, organic agriculture. In this paper, we analyze the PGS project initiated by the ECOFARM, an agricultural cooperative in Siem Reap province. Through this research, we aim to gain an understanding as to what extent PGS certifications are working for farmers and the contribution that PGS makes to the livelihoods of farmers. We concluded that PGS is a highly adaptable system, which allows for a diverse group of smallholder farmers to access markets they would otherwise be excluded from. PGS contributes positively to these lives, as it offers a certification process that is adaptable to the livelihoods of smallholder farmers. The
production of organic vegetables allows for income benefits and job creation. Such benefits reduce the need for those affected by poverty to migrate for work.

### Grading Scheme

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<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>95.00 - 100%</td>
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<tr>
<td>A-</td>
<td>90.00 - 94.99%</td>
</tr>
<tr>
<td>B+</td>
<td>86.00 - 89.99%</td>
</tr>
<tr>
<td>B</td>
<td>83.00 - 85.99%</td>
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<tr>
<td>C+</td>
<td>76.00 - 79.99%</td>
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<tr>
<td>C</td>
<td>73.00 - 75.99%</td>
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<tr>
<td>D</td>
<td>60.00 - 69.99%</td>
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<tr>
<td>F</td>
<td>&lt;60.00%</td>
</tr>
<tr>
<td>B-</td>
<td>80.00 - 82.99%</td>
</tr>
<tr>
<td>C-</td>
<td>70.00 - 72.99%</td>
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### General Reminders

**Intellectual Property** – There are many implications about intellectual property and the use of data and research frameworks beyond your semester experience. Many DR projects form part of ongoing and developing research lines at SFS Centers, the work of which is the intellectual property of SFS faculty. However, faculty are always interested in continuing collaborations, and there is often the possibility for student co-authorship on future academic publications. We will discuss the ethics of data gathering and academic publications during the semester, but you can also review in advance SFS’s data policy.

**Plagiarism** – Using the ideas and material of others without giving due credit, is cheating and will not be tolerated. A grade of zero will be assigned if anyone is caught cheating or aiding another person to cheat actively or passively (e.g., allowing someone to look at your exam). All assignments unless specifically stated should be individual pieces of work.

**Deadlines** – Deadlines for written and oral assignments are instated for several reasons: they are a part of working life to which students need to become accustomed and promote equity among students. Deadlines allow faculty ample time to review and return assignments before others are due. Late assignments will incur a 10% penalty for each day that they are late. No assignment will be accepted after three days. Assignments will be handed back to students after a one-week grading period.

**Participation** – Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for lost time. Participation in all components of the program is mandatory because your actions can significantly affect the experience you and your classmates have while at SFS. Therefore, it is important that you are prompt for all DR activities, bring the necessary equipment for field research, and simply get involved.

### Course Content

**Note:** please alter the order/time/type of the lectures, or even how the lectures are broken up, to fit your teaching methods and objectives. Please just make sure to cover the mentioned topics and have **between 10 and 15 total contact hours** in the “classroom” portion of DR.

L: Classroom lecture, L/Demo: Classroom lecture and demonstration

**DR Coursework Component:** The coursework component of the DR is designed to prepare the students to conduct scientific research. The lectures are delivered throughout the semester, in conjunction with
the topical courses, so that students are well prepared to work with their faculty mentor on meaningful research. Some of the course activities below will be delivered to the whole class, or as part of your specific DR group once you have selected a given project.

<table>
<thead>
<tr>
<th>No</th>
<th>Title and Outline</th>
<th>Type</th>
<th>Hours</th>
</tr>
</thead>
</table>
| DR 01 | DR Course Introduction  
In this class, each Faculty will do a 30-minute overview of their DR to enable students do an informed decision in selecting their DR choice | L       | 1.0   |
| DR 03 | Introduction to the Scientific Method  
Familiarize students with the process of science and associated methods | L       | 1.0   |
| DR 04 | Introduction to Scientific Writing & Reading  
Explore the difference between primary and secondary sources; expectations and standards of practice; describe expectations for the DR paper | L       | 1.0   |
| DR 05 | Qualitative & Quantitative Research Methods  
Lecture will introduce students to qualitative and quantitative research | L/Demo  | 2.0   |
| DR 06 | Research Ethics  
The lecture will introduce students to the ethical considerations involved in research (e.g. human subject’s protection, data integrity and management) | L       | 1.0   |
| DR 07 | Risk & Time Management in DR  
Will prepare students on how to manage risks in the field during data collection, and how to effectively manage the time allocated for the DR course | L       | 1.0   |
| DR 08 | Effective Scientific Communication Skills  
Students will understand the importance of scientific communication skills and start to think about how to address different audiences | L       | 1.0   |
| DR 09 | Analytical Tools and Statistics  
Students will learn the various methods that they will use to analyze and represent data from the field which suits their respective DR projects. | L/Demo  | 3.0   |
| DR 11 | Project Development & Proposal  
Faculty will lay out expectations of student proposals and students and faculty will form discussion groups to further DR proposals. | L/Demo  | 4.0   |

**Total 15 Hours**

**DR Research Component**  
This portion of the DR course is made up of research time, which includes data collection, synthesis, and dissemination. Given the intense nature of the Directed Research project, students receive over 140 contact hours during this period.

<table>
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| **Data Collection**  
Students work within their DR group to go into the field to collect data | 12 days |
| **Data Synthesis**  
Students work closely with their faculty mentors to analyze their collected data and write up their findings in a structured scientific paper | 5 days |
| **Research Dissemination**  
Students prepare, practice, and deliver presentations for SFS and community audiences. | 3 days |

**Total 20 days**