Directed Research
SFS 4910

John Mwamhanga, M.S.
Christian Kiffner, Ph.D.
John Kioko, Ph.D.

The School for Field Studies (SFS)
Center for Wildlife Management Studies (CWMS)
Karatu, Tanzania

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.
Center Research Direction

The SFS-CWMS (Tanzania) program is geared towards preparing students to answer the following case study question:

*How can changes in land use and resource availability in the Maasai Steppe of Tanzania be managed in such a way as to foster the well-being of local communities whilst safeguarding and promoting biodiversity conservation?*

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 and conservation. This course prepares students to distinguish hidden assumptions in scientific approaches. We will also investigate the ways that various methods and theories differentiate (or do not) fact from interpretation, cause from correlation, and advocacy from objectivity. Through the Directed Research projects, students will contribute to a growing body of scientific research that informs local conservation and resource management decisions and further the Center’s research agenda.

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, and social sciences. The Directed Research course is designed to build on the information students have learned in the topical 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 (see below for these courses). The research projects being conducted this semester are the following:

Please be aware that the following DR topics are from the previous semester and may change in future terms based on local conditions, research permits, learning opportunities, and faculty expertise.

1. **Project Supervisor: John Mwamhanga, Msc.**

   **Project 1: Ecological, Economical and Cultural Values of Natural Resources in Tarangire-Manyara Ecosystem, Northern Tanzania.**

   **Background**

   The Tarangire-Manyara ecosystem (TME) of northern Tanzania is a site of global biodiversity significance, and has the second highest abundance of migratory large mammal species in East Africa after the Serengeti-Mara ecosystem. The Tarangire-Manyara ecosystem links the Serengeti-Loliondo-Maasai Mara complex to the west with areas to the east such as the Amboseli-West Kilimanjaro landscape. The Maasai are the predominant ethnic group in the area and are mainly pastoralists. Other major ethnic groups in the project area are the Waarusha, Barabaig and Iraqw. Over the past twenty years there has been significant immigration of other ethnic groups into the area. This study will be conducted in Ngorongoro Conservation Area, Villages surrounding Buger Community Forest and Burunge Wildlife Management Area, all located in the North-West of TME.

   Buger Community Forest is located in Karatu District between 3°68’S and 3°60’S and 35°65’E and 35°61’E (Fig 1). It is situated northwest of the Marang forest reserve and 35 kilometers south of Karatu Town in the Mbulu highlands. The reserve is surrounded by the villages of Kambi ya Faru, Kansay and Buger and has an area of 755.64 hectares. It receives approximately 1200-1500 mm of rain annually and belongs to the Lake Manyara drainage basin (Lovett & Pócs, 1993). The forest is mostly montane and the reserve is
filled with tall hills with steep changes in elevation (Lovett & Pócs, 1993). The soil is mostly Basement Complex gneiss (Prins & Van der Jeugd, 1992) and has high iron and mineral content (Lovett & Pócs, 1993). Buger forest reserve sits at approximately 1000 meters above sea level (Prins & Van der Jeugd, 1992) in an area inhabited by predominantly Iraqw communities. The major human activities are agriculture and livestock keeping (Yanda & Madulu). Due to increases in human population pressure and recently decision of including a nearby Marang Forest Reserve to be part of Manyara National Park, the area has been experiencing increases in deforestation and consequently, increased erosion (African Wildlife Foundation, 2003).

The local communities of Buger, Kansay and Kambi ya Faru have been using natural vegetation and forest produce from Buger Community Forest to sustain their daily livelihood. It is not known how the benefits derived from this forest influence local communities’ conservation actions and attitudes towards the community forest. The status of the forest resources is also not known. By comparing with data initially collected in 2013, this study intends to examine the changes in economic, social and cultural benefits of the forest reserve to the local community and analyze whether these benefits have influenced changes in attitudes and the conservation action of the forest resources in the community forest.

To collect data for this study we will use a combination of participatory tools including focus group discussions, Key informants, interviews through semi-structured questionnaire and field observations. Sample Plots Assessment techniques will be used to obtain data on the forest status. The field data will be compared with the data collected in 2013/14 study period.

**Sub Projects:**

1. Status of Natural Vegetation and forests on village lands.
2. Local peoples’ firewood tree species preference.

**References:**


**Project 2: Assessment of Ecosystem services in Lake Manyara Biosphere Reserve.**

The Lake Manyara Biosphere Reserve (LMBR) was established by UNESCO in 1981. It is located in the Lake Manyara Basin in northern Tanzania. The objective of LMBR is to ensure the long-term conservation of biodiversity including local population and its sustainable use. Most of its indigenous people (*Maasai, Iraqw and Barabaig*) are practicing pastoralism and agriculture. The reserve is managed by TANAPA with a total surface area of 2,833,000 hectares. The core area of the LMBR is 33,000 hectares, of which Lake Manyara is 10,000 hectares, surrounded by buffer zone(s) of 1,000,000 hectares and transition area(s) of 1,800,000 hectares.
The main aim of this project is to study and document the ecosystem services (ES) provided by Lake Manyara Biosphere Reserve that will enable to establish the link between men and nature in LMBR which is not adequately known. The specific objectives of the study are: (i) to identify the ES provided by the Biosphere reserve in the transition zone, (ii). to prioritize the ES for different stakeholders (iii) to assess the management status of priority ES in the transition zone. The findings will lead to proper valuation to ecosystem services and once the values are known they will promote conservation of these ecosystem services. Social sciences methods especially structured interviews and focus group discussions will be used to collect social data.

References:


2. Project Supervisor: Christian Kiffner, PhD

Project title: Wildlife conservation in human dominated landscapes

In northern Tanzania, rapid human development and ineffective land-use planning lead to frequent interactions between wildlife and humans. These interactions (e.g. illegal hunting, human-wildlife conflict) can impact humans, livestock and wildlife. We study this system in a pressure-state-response framework: Based on our long-term monitoring program in several protected areas and using specific longitudinal or experimental studies, we assess how human activities affect different aspects of wildlife populations and based on interviews, we assess how wildlife affect human livelihoods.

To obtain relevant data, we use camera traps and field sampling methods (mainly line transects surveys) to quantify wildlife and habitat related parameters, and social science (structured interviews) to assess livelihood-related variables. We estimate relevant variables such as density or occupancy using robust...
analytical methods (distance sampling, occupancy modeling) and test specific hypotheses using appropriate statistical tests and models.

**Subprojects:**
- Wildlife population trends in Yaeda Valley
- Wildlife population trends in the Tarangire-Manyara Ecosystem
- Species richness, occupancy and activity patterns of wildlife in the Kideru ridge
- Perceived human elephant conflict and effectiveness of elephant damage prevention methods

**References:**


Ripple et al. (2014) Status and ecological effects of the world’s largest carnivores. Science 343, 1241484

3. **Project Supervisor: John Kioko, PhD**

**Project title:** Social-ecological relations between protected areas and adjacent communities in northern Tanzania

Understanding local people perspectives on protected areas is integral to managing wildlife. This is one of the priority research areas identified by Tanzania National Parks Authority for northern Tanzania. This is important because of the constant interactions between local people and wildlife. To acquire data, interviews among key community members adjacent protected areas of Ngorongoro, Lake Manyara, Tarangire and Burunge will be undertaken at household level. A question specific to this study will be prepared and used to gather data. In addition, focussed group interviews with key stakeholders will be undertaken in each of the areas. About 12 students will be enlisted for this study, whereby they will collect data as a group but do individual or group papers. The study will attain the following objectives:

1. Understand the social-economic benefits of protected areas of Ngorongoro Conservation Area, Lake Manyara National Park, Tarangire National Park and Game controlled areas.

2. Evaluate community awareness of protected areas of Ngorongoro Conservation Area, Lake Manyara National Park, Tarangire National Park and Game controlled areas.

3. Evaluate community perceptions & relations with protected areas of Ngorongoro Conservation Area, Lake Manyara National Park, Tarangire National Park and Game controlled areas.

**References**


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

1. Understand the process of designing a field research project
2. Conduct field data collection
3. Manage, interpret and analyze data sets
4. Communicate research results to diverse audiences

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>
</tr>
</thead>
<tbody>
<tr>
<td>Project proposal</td>
<td>10</td>
</tr>
<tr>
<td>Final report</td>
<td>55</td>
</tr>
<tr>
<td>Presentation</td>
<td>20</td>
</tr>
<tr>
<td>Data management</td>
<td>5</td>
</tr>
<tr>
<td>Directed Research Skills</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Project Proposal (10%): The project proposal has two elements: a Literature Review and a Project Summary.

1. 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 literature review 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 Literature Review should include:

- A full literature review: A critical evaluation of knowledge in subject area
- An exploration of the DR project status within the literature: Highlight knowledge gaps and how the proposed project fits within the current literature

2. Project Summary
The main objective of the Project Summary is for students to develop a detailed outline (framework) for their Directed Research. The DR Project Summary must include the following items:
- **Aims/Hypothesis(es):** A list of questions that the student would like to answer as a result of the research project they will design.

- **Materials & Methods** A detailed description of the methods to be used in their study and why these methods will be used over other potential methods. This should include sampling design, as well as the physical data collection methods to be employed.

- **Predicted Findings & Importance**: A list of ‘predicted findings’ and implications for each

**Final Report (55%):** 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 workshops 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 12 min length with additional time for questions. Unless the scope of your DR project is very small, you should not attempt to squeeze in everything from your final report into this presentation. Making sure that you are within the time limit is a very important skill and so thorough rehearsal is important.

**Data Management (5%):** It is important to record and store research data in a manner that is useful. You will need to provide (as applicable) Excel sheets 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 (10%):** 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.

**Grading Scheme**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>95.00 - 100%</td>
</tr>
<tr>
<td>B+</td>
<td>86.00 - 89.99%</td>
</tr>
<tr>
<td>C+</td>
<td>76.00 - 79.99%</td>
</tr>
<tr>
<td>D</td>
<td>60.00 - 69.99%</td>
</tr>
<tr>
<td>A-</td>
<td>90.00 - 94.99%</td>
</tr>
<tr>
<td>B</td>
<td>83.00 - 85.99%</td>
</tr>
<tr>
<td>C</td>
<td>73.00 - 75.99%</td>
</tr>
<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>
</tr>
</tbody>
</table>

**General Reminders**

**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 land and water based activities, bring the necessary equipment for field exercises and directed research, and simply get involved.

**Course Content**

**DR Coursework Component:**

**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. When we post the DR syllabus, we will likely remove the Time column, but it is here for your reference.**

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.

Key: L: Lecture, FL: Field Lecture, FEX: Field Exercise, T: Test, D: Discussion or Breakout Session.

Faculty: JM = John Mwamhanga, JK: John Kioko, CK = Christian Kiffner

<table>
<thead>
<tr>
<th>Lecture Title and Description</th>
<th>Type</th>
<th>Time (hrs) suggested</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR01 DR Course Introduction</td>
<td>L</td>
<td>1</td>
<td>JM, JK, CK</td>
</tr>
<tr>
<td>Should happen the first few days being at the center does not need to include Faculty project introductions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DR02 Introduction to Science &amp; the Scientific Method</td>
<td>L/FL</td>
<td>1</td>
<td>JK</td>
</tr>
<tr>
<td>Familiarize students with the process of science</td>
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<td></td>
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</tr>
<tr>
<td>DR03 Introduction to Scientific Writing &amp; Reading</td>
<td>L</td>
<td>1.5</td>
<td>JK</td>
</tr>
<tr>
<td>Explore the difference between primary and secondary sources; expectations and standards of practice; describe expectations for paper</td>
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</tr>
<tr>
<td>DR04 Qualitative &amp; Quantitative research</td>
<td>L/FL</td>
<td>2</td>
<td>JK</td>
</tr>
<tr>
<td>Lead discussions on these topics (not exhaustive, but overviews), introduce collection methods for each, gather a background on student’s current exposure to these topics</td>
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<tr>
<td>DR05 Research Ethics</td>
<td>L</td>
<td>1</td>
<td>JM</td>
</tr>
<tr>
<td>Introduce students to the ethical considerations involved in research (e.g. human subjects protection, data integrity and management).</td>
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<td></td>
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<tr>
<td>DR06 Risk &amp; Time Management in DR</td>
<td>L</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lecture Title and Description</td>
<td>Type</td>
<td>Time (hrs) suggested</td>
<td>Lecturer</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------------------</td>
<td>------</td>
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</tr>
<tr>
<td>DR07 Effective Scientific Communication Skills</td>
<td>L</td>
<td>3</td>
<td>JM, JK, CK</td>
</tr>
<tr>
<td>Students will understand the importance of practicing scientific communication skills and start to think about how to address different audiences.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>DR08 Statistics</td>
<td>L</td>
<td>2</td>
<td>CK</td>
</tr>
<tr>
<td>A brief introduction to basic statistical theory and use of statistical software (use of example data)</td>
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<tr>
<td>DR09 Project Development &amp; Proposal</td>
<td>L/D</td>
<td>1.5</td>
<td>JM, JK, CK</td>
</tr>
<tr>
<td>Faculty will lay out expectations of student proposals and students and faculty will form discussion groups to further DR proposals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>14</td>
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</table>

**DR Research Component:**

**Note: you may change the number of days allocated in each activity according to your schedule. However, have no fewer than 10 days, but no more than 15, allocated as data collection days.**

The rest of the DR course is made up of research time, which includes: data collection; synthesis; and dissemination. Given the intense and mentored nature of the Directed Research project, the students receive over 140 contact hours during this time period.

<table>
<thead>
<tr>
<th>Research Component Activity</th>
<th>Days Allocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Collection</td>
<td>10</td>
</tr>
<tr>
<td>Students work within their DR group to go into the field to collect data</td>
<td></td>
</tr>
<tr>
<td>Data Synthesis</td>
<td>10</td>
</tr>
<tr>
<td>Students work closely with their faculty mentors to analyze their collected data and write up their findings in a structured scientific paper</td>
<td></td>
</tr>
<tr>
<td>Research Dissemination</td>
<td>3</td>
</tr>
<tr>
<td>Students prepare, practice, and then deliver presentations for both internal SFS and community audiences.</td>
<td></td>
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</table>