***Shortfalls in SAR-M.Phil*- Incorporated in the draft**

- Discussion of Performa 1 and 10 missing

  Action taken: Done
- Performa 2 was missing

  Action taken: added
- Performa 7 was missing

  Action taken: Added.

PirMehr Ali Shah

Arid Agriculture University Rawalpindi

Self Assessment Report

4th Cycle (Fall 2012 to Spring 2014)

M.Phil. Wildlife Management

Department of Wildlife Management

Prepared by:

1. **Prof. Dr. Maqsood Anwar (Coordinator)**
2. **Dr. Tariq Mahmood (Member)**
3. **Dr. Muhammad Rais (Member)**

CONTENTS

List of Tables

INTRODUCTION

The Department of Wildlife Management at PirMehr Ali Shah Arid Agriculture University Rawalpindiwas established in 2007 with a mandate to carry out teaching and research on wildlife, suggesting measures for conservation of its populations and habitat, especially focusing on threatened species, management of protected areas and wetlands, and management of human-wildlife conflict. The department is offering postgraduate degrees of M.Sc., M.Phil. and Ph.D. in wildlife management. The students' enrollment during the reporting period was25 in M.Phil.The faculty members and students of this department have published more than 49 research papers (as senior author or co-author) during the last two years.

An extensive scheme of study (consisting of 32 courses) has been developed for post graduate degree programme in the field of wildlife management including all major aspects such as wildlife study techniques, wildlife population, management, diseases and captive breeding, management of protected area, wetlands and terrestrial habitats, wildlife policy, laws, conservation strategies and conventions, wildlife damage management, threatened species management, illegal trade, etc. The courses are supported by latest text books and research publications.

Presently, the research studies conducted by the students and faculty focus on population density and size, wildlife habitat analysis, evaluation and preference, food habits and diet composition, breeding habits and breeding biology, distribution of wildlife species in their habitat, baseline data on protected areas and threatened species, wetland ecology, population size and trends of water birds, threats to wildlife species, estimation of home ranges of large mammals etc. In future, the department would address major issues on wildlife population, habitat and threats, developing strategies for their conservation and environmental education/awareness among the public.

The research facilities have been established both in the field as well as in the laboratory. Necessary field equipments required for conducting wildlife research studies have been procured under HEC funded development and research projects as well as university funded research projects. This includes; live traps, nets, binoculars, spotting scopes, digital cameras, camera traps, GPS, camping gear, radio-telemetry, glassware, refrigerators, ovens, deep freezers, chemicals, etc.

The faculty members implemented seven research projects during reporting period which included; i) "Baseline studies on wildlife diversity in selected protected areas of Pakistan-Phase-II funded by HEC for a period of three years (2014-17), amounting to Rs. 3,916,555.00, ii) "Ecology of Indian pangolin (*Manis crassicaudat*a) in Potohar region" funded by HEC amounting to Rs. 2.158 m was completed during the report period.iii) "Spatial distribution of habitats influences anuran diversity and space use in the landscape: implications for conservation beyond species level" funded by International Foundation for

Science, Sweden (2013-2016) amounting to US$12,000/-, iv) “Ecology and conservation of soft-shell turtles (Family Trionychidae) in North Punjab, Pakistan” (2013-2016) funded by Idea Wild for US$ 1000/-,v) “Establishment of Aviary Facility for Captivity Breeding of Fancy Birds (2014 Completed) funded by PMAS-AAUR amounting to Rs. 150,000/-, vi) “Establishment of Aviary Facility for Captivity Breeding of Wild Birds” (2014 Completed) funded by PMAS-AAUR amounting to Rs. 150,000/- and vii) “Evaluation of acrosomal status of Red Jungle Fowl spermatozoa with bright field, phase contrast and differential interference contrast microscopy” (2012-13 completed) funded by PMAS-AAUR amounting to Rs. 0.133 m.

More than 270 books related to wildlife ecology, management and conservation are available in the departmental library, in addition to several books in university central library for ready reference to the students. In addition, students are encouraged to get electronic copies of latest research papers related with their area of research by contacting relevant authors, institutions, publishers, etc.

This Self-Assessment Report (SAR) is based on eight criteria. The first criterion outlines the program mission and objectives. Criterion 2 provides information about the curriculum development. Criterion 3 enlists the laboratories and other relevant information. The fourth criterion is pertinent to the information about students' support and advising. The last four criteria provide information about process control, faculty characteristics and institutional facilities and support.

CRITERION 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

Standard 1.1. The program must have measurable objectives to support Mission

Mission Statement: To provide in-depth knowledge on wildlife biology / ecology / conservation / management and generate knowledge through thesis research.

Objectives:

1. To create a corps of wildlife biologists for management of wildlife of the country.
2. To impart training for conducting research studies on wildlife species and their habitat for promoting conservation.
3. To impart knowledge about current global issues related to biodiversity/wildlife conservation.

Main elements of strategic plan to achieve mission and objectives:

- Development of sound teaching system based on experience and vision gathered from literature, reviews, symposia, workshops, etc. for the award of degrees.
- Designing of curricula including core subjects, elective subjects, specialized areas, internship programs and study tours.
- Setting up of well equipped laboratories for students as per available resources.
- Conducting research studies through writing of synopses and theses.
- Development of scientific writing and presentation skills assignments and research reports.
- Publication of scientific papers, popular articles, books, etc.
- Arranging study tours to provide knowledge to students about wildlife management.

The assessment of the program objectives through different criteria is presented in Table 1.

Table 1. Program Objectives Assessment for M. Phil.

S. #	Objective	How Measured	When Measured	Improvement Identified	Improvement made
1	To create a corps of wildlife biologists for management of wildlife of the country.	Test their knowledge about Wildlife management techniques through tests / comprehensive exams	During the semesters and at the time of written & oral comprehensive exams	Courses to be updated by inducting new knowledge/ techniques & induct new courses when required	Revision of curriculum and induction of new courses.
2	To impart training for data collection and analysis about wildlife species and their habitat for promoting its conservation.	Assessing the interest of students, quality of their thesis research studies	During synopsis writing for starting of research and thesis writing on completion of research	Students to make presentations and submit reports	Presentations, seminars started for communication skill development
3	To impart knowledge	Assess their	During the	Courses to be	Revision of

	about global issues related to biodiversity / wildlife conservation	knowledge aboutthese aspects through tests / comprehensive exams / presentations	semesters and at the time of written & oral comprehensive exams	regularly updated by inducting new knowledge on global issues and trends	relevant course contents and induction of new courses.

Standard 1.2 The program must have documented outcomes for graduating students. It must be documented that the outcomes support the program objectives and that graduating students are capable of performing these outcomes

Students of M.Phil.in Wildlife Management should possess the ability of:

- Identification of problems in wildlife management/conservation and suggest appropriate solutions
- Preparation of problem based research proposals and use of scientific study techniques.
- Communication skills through presentations, oral discussions, scientific and review articles, etc.
- Scientific writing skills and publication of research papers and popular articles in scientific journals.

Table 2. Relationship of Program Objectives with Program Outcomes

Program Objectives	**Program Outcomes**			
	Wildlife management Skills	**Developing Research Proposals**	**Communication skills**	**Scientific writing/ publishing**
Education	+++	++	++	++
Research	++	+++	+++	++
Global issues	++	+	+	

+ = Moderately satisfactory ++ = Satisfactory +++ = Highly satisfactory

Teacher's evaluation

Four teachers of the department teach classes to M.Phil.students namely:

1. Dr. Iftikhar Hussain Professor
2. Dr. Maqsood Anwar Professor
3. Dr. Tariq Mahmood Assistant Professor
4. Dr. Muhammad Rais Assistant Professor

The teachers were evaluated by the students at the end of course completion through the proforma-10.Details of teachers' performance are given in Figs. 1-8.

WL-703

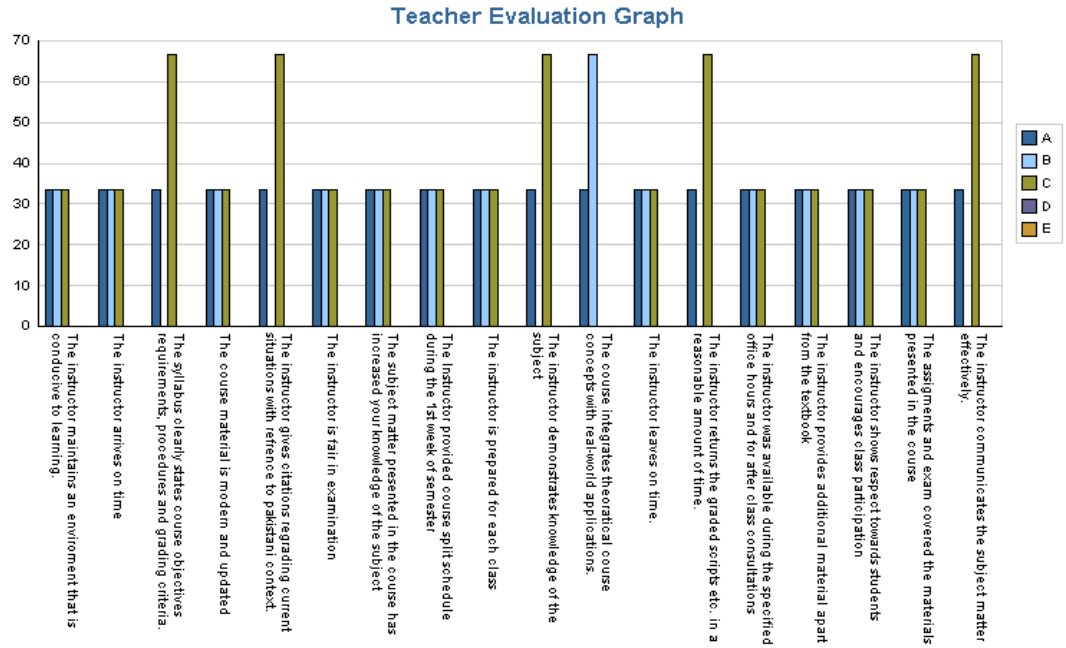


Figure1. Teacher Evaluation for WL-703 during Fall-2013

Discussion- The majority of the students gave mixed responses regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material.

WL-704

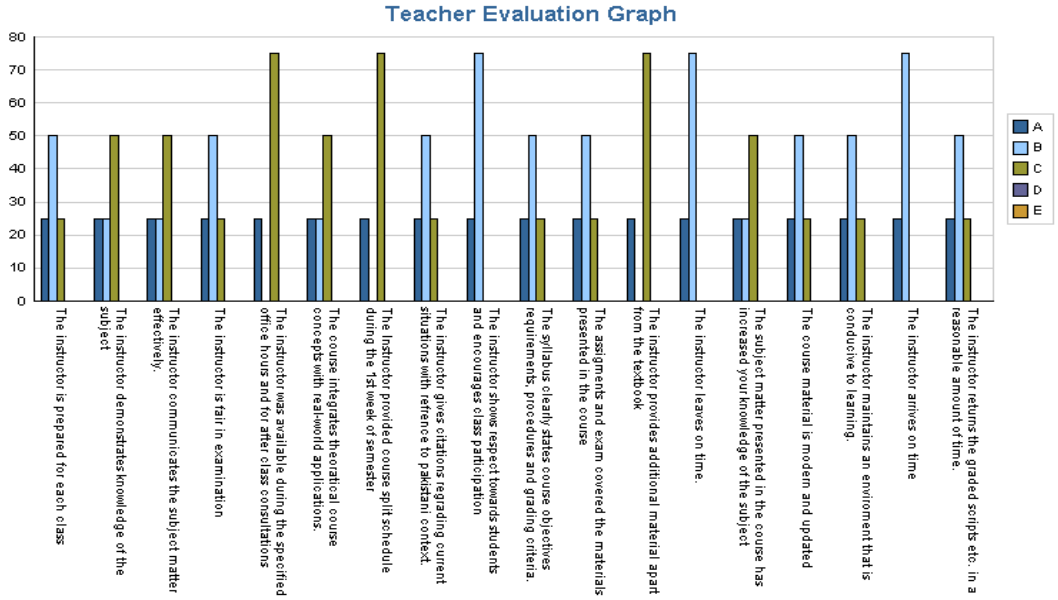


Figure 2. Teacher Evaluation for WL-704 during Fall-2013

Discussion: The majority of the students gave mixed responses regarding the instructor's abilities, method of teaching and lecture preparedness. Few students were unsatisfied with the instructors' availability, fairness in paper checking and provision of course material.

WL-705

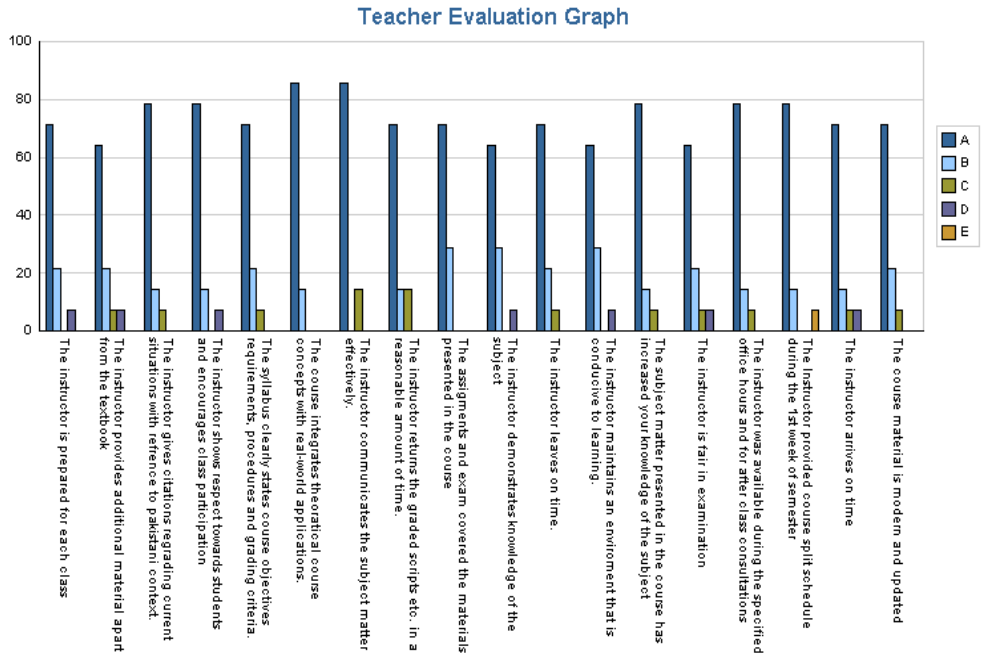


Figure 3. Teacher Evaluation for WL-705 during Spring-2013

Discussion: The majority of the students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material**.**

WL-710

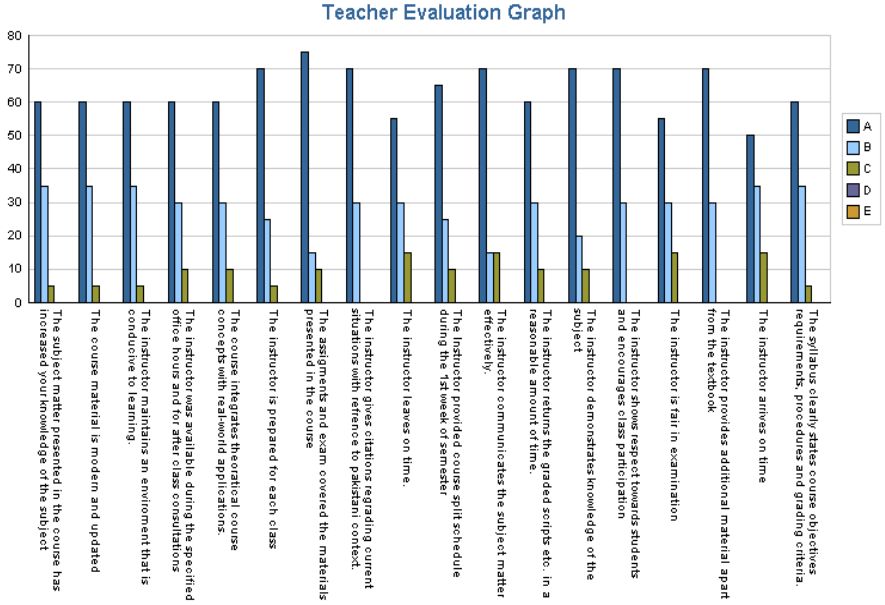


Figure4. Teacher Evaluation for WL-710 during Fall-2013

Discussion: The majority of the students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material.

WL-713

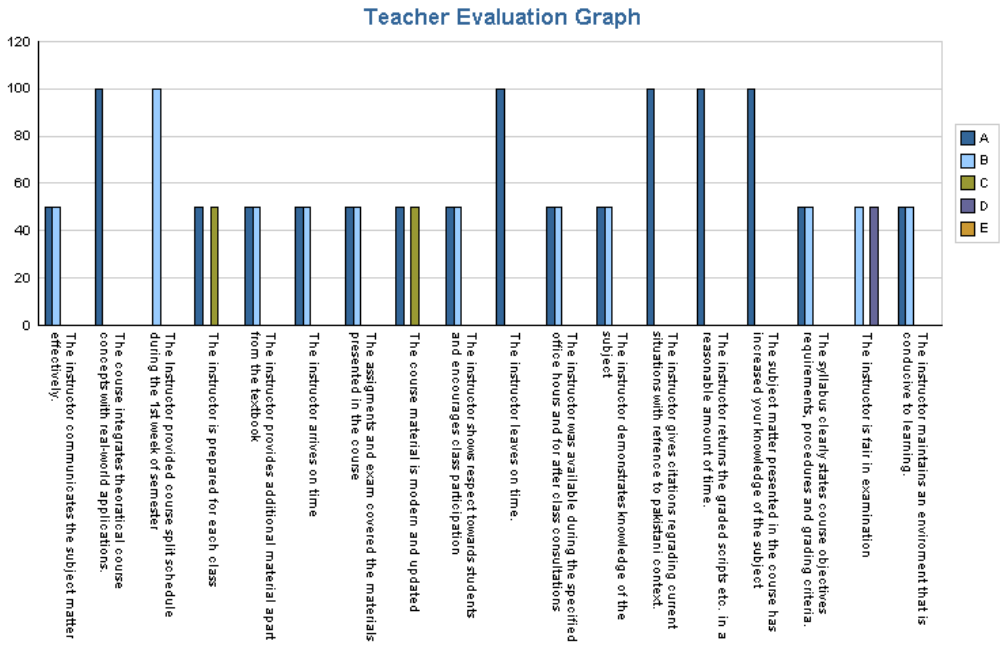


Figure 5. Teacher Evaluation for WL-713 during Spring-2014

Discussion: The majority of the students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material. Few students showed low level of satisfaction about course contents with respect to present global scenario.

WL-715

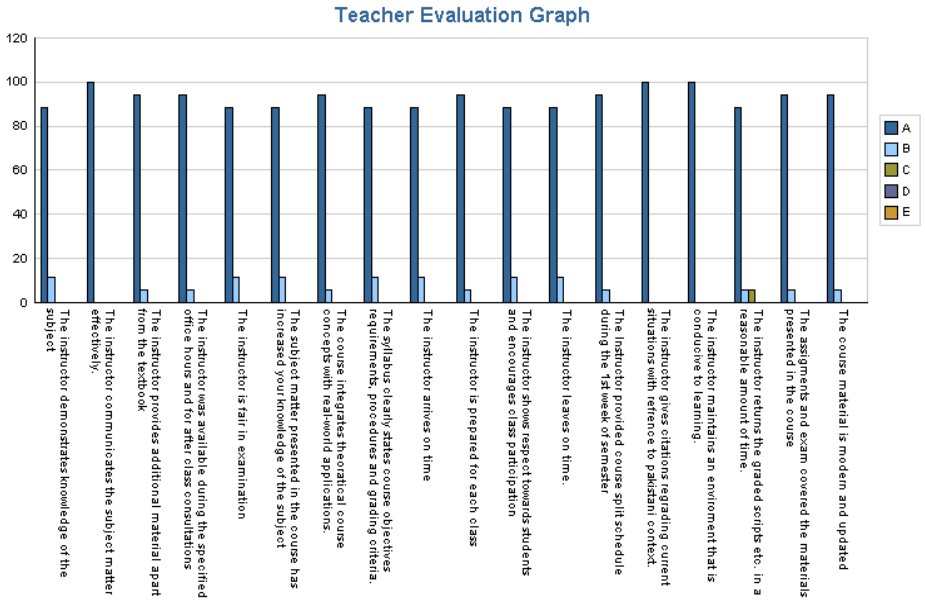


Figure 6. Teacher's evaluation for WL-715 during spring 2013.

Discussion: The majority of the students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material.

WL-728

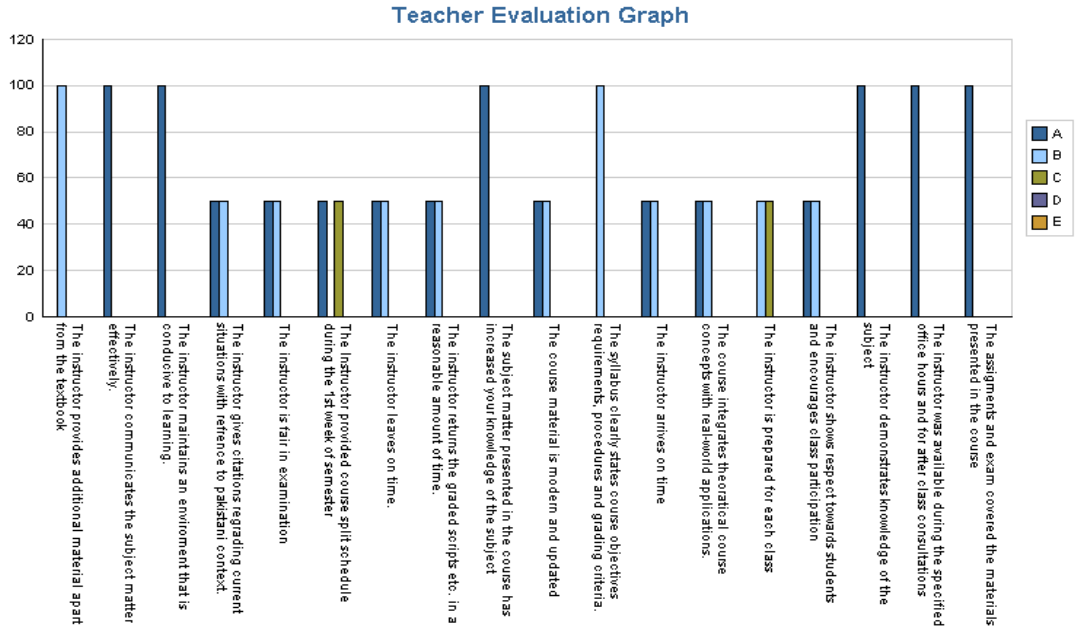


Figure7. Teacher Evaluation for WL-728 during Spring-2014

Discussion: The majority of the students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material. Few students were unsatisfied with the provision of course spilt schedule.

WL-732

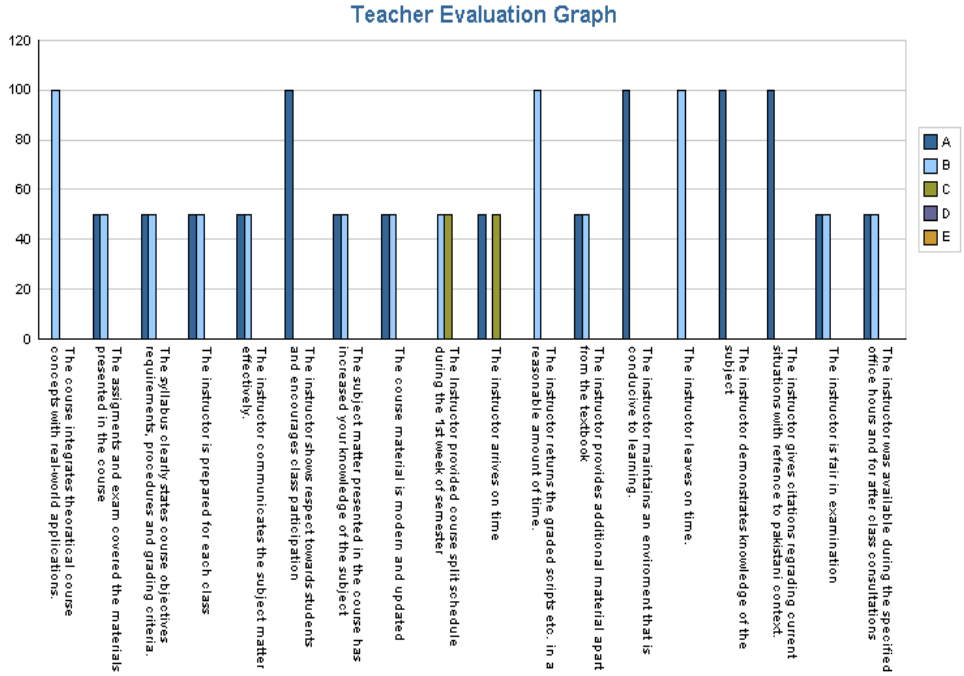


Figure 8. Teacher Evaluation for WL-732 during Spring-2014

Discussion: The majority of the students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and

provision of course material. Few students were unsatisfied with the provision of course spilt schedule.

Course Evaluation

The courses offered during the report period (Fall 2012 to Spring 2014) are given in Table 3.

Table 3 Courses offered and evaluated for M.Phil. from Fall 2012 to Spring 2014

#	Code	Course Title	Semester	Teacher
1	WL-703	Principles of Wildlife Management	Fall 2013 + Spring 2013	Dr. Tariq Mahmood/Dr. Iftikhar Hussain
2	WL-704	Wildlife Study Techniques-I: Biological Aspects	Fall 2012 + Fall 2013	Dr. Iftikhar Hussain
3	WL-705	Wildlife Study Techniques-II: Management Aspects	Spring 2013	Dr. Iftikhar Hussain
4	WL-710	Protected Areas and their management	Fall 2012+ Fall 2013	Dr. Maqsood Anwar
5	WL-713	Wildlife Food and Foraging	Spring 2014	Dr. Tariq Mahmood
6	WL-715	Management Aspects of Wildlife Behavior	Spring 2013	Dr. Maqsood Anwar
7	WL-728	Wildlife policy, legislation and international conventions	Fall 2012 +Spring 2014	Dr. Maqsood Anwar
8	WL-732	Wildlife Data Analysis	Spring 2014	Dr. Muhammad Rais/ Dr. Tariq Mahmood

These offered courses were evaluated by the students at the end of course completion through proforma-1. Details of evaluation of each course are given below as in Figs. 9-17.

WL-703

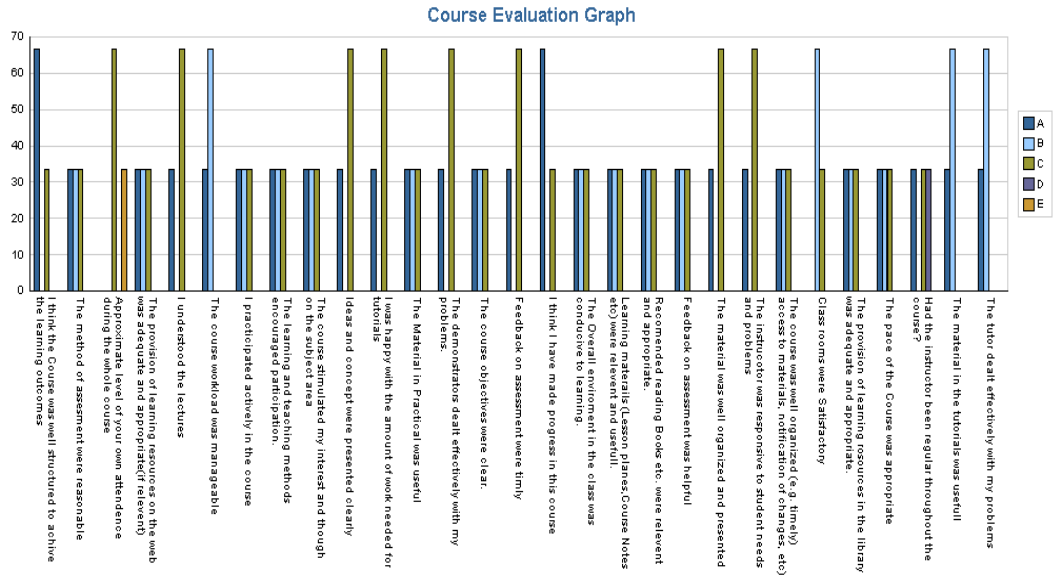


Figure 9. Course Evaluation of WL-703 during Fall 2013

Discussion: The majority of the students showed mixed level of satisfaction and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was

helpful in solving the problems. Few students were unsatisfied with the conditions of classrooms.

WL-704

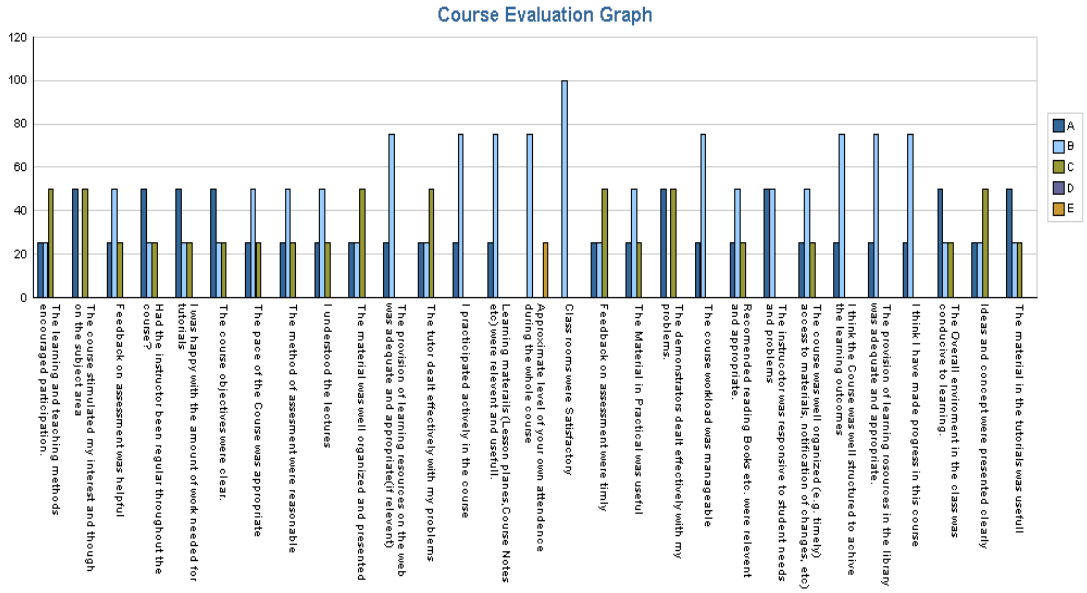


Figure10. Course Evaluation of WL-704 during Fall-2013

Discussion: The majority of the students showed mixed level of satisfaction and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

WL-705

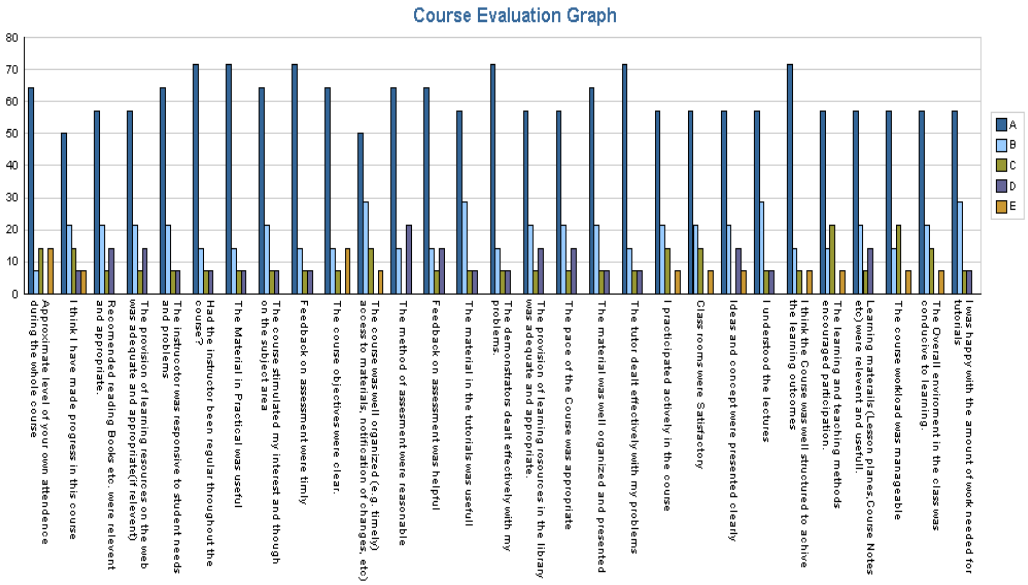


Figure11. Course Evaluation of WL-705 during Spring-2013

Discussion: The majority of the students were satisfied and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

WL-710

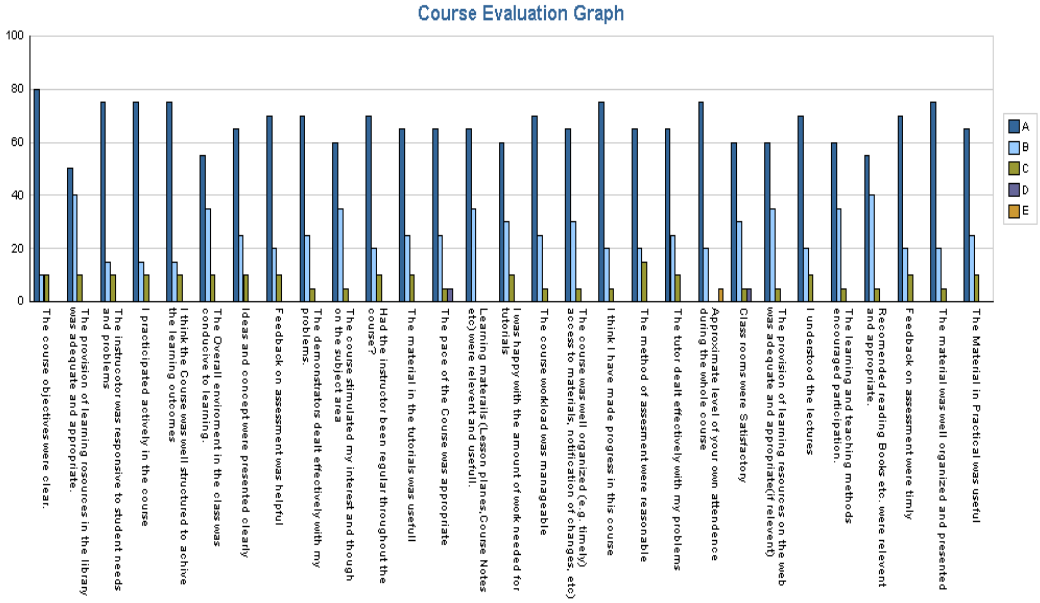


Figure12. Course Evaluation of WL-710 during Fall-2013

Discussion: The majority of the students were satisfied and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

WL-713

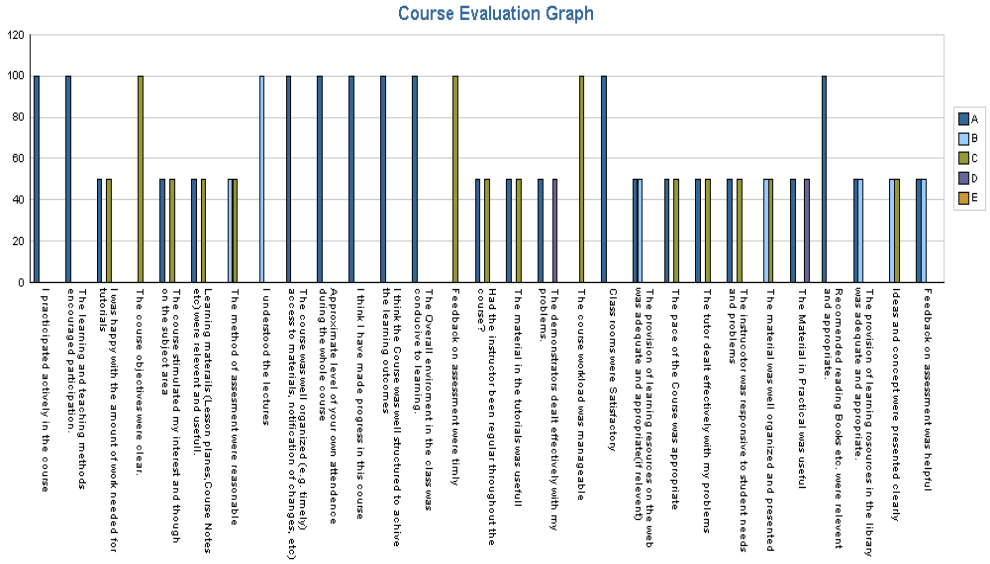


Figure 13. Course Evaluation of WL-713 during Spring-2014

Discussion: The majority of the students were satisfied and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

WL-715

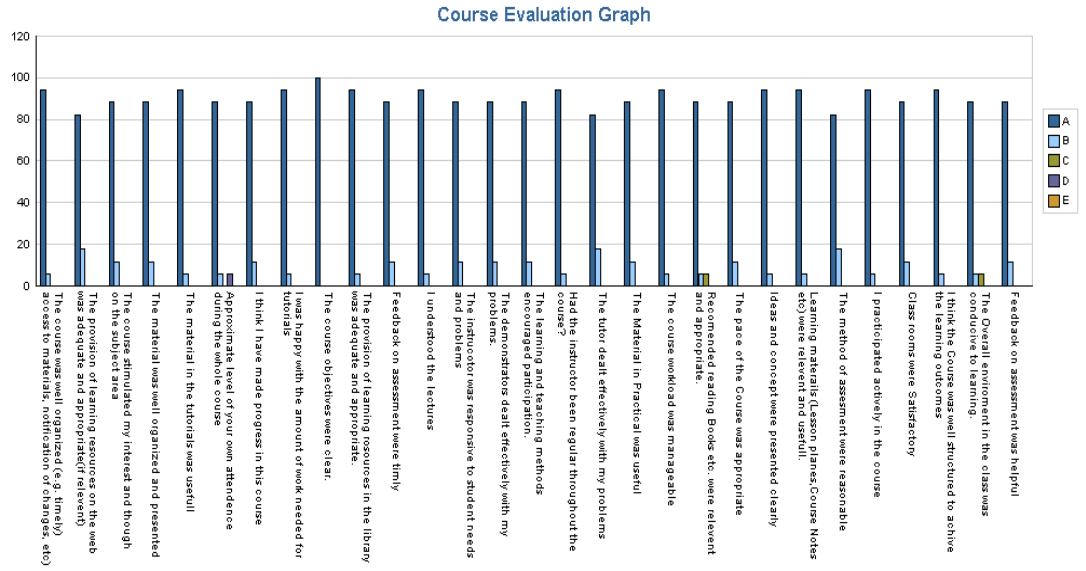


Figure14. Course Evaluation of WL-715 during Spring-2013

Discussion: The majority of the students were satisfied and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

WL-728

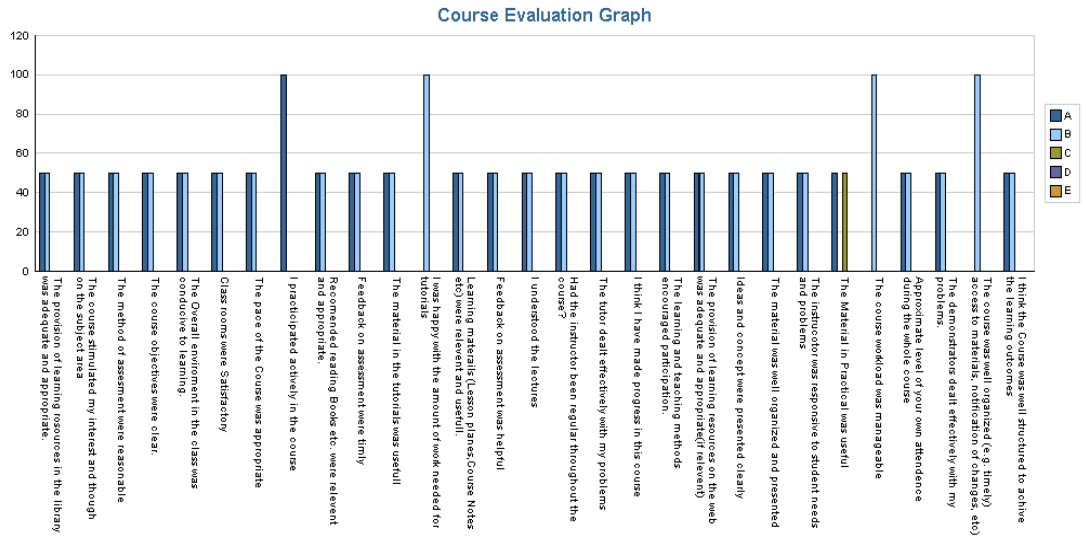


Figure16. Course Evaluation of WL-728 during Spring-2014

Discussion: The majority of the students were satisfied and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

WL-732

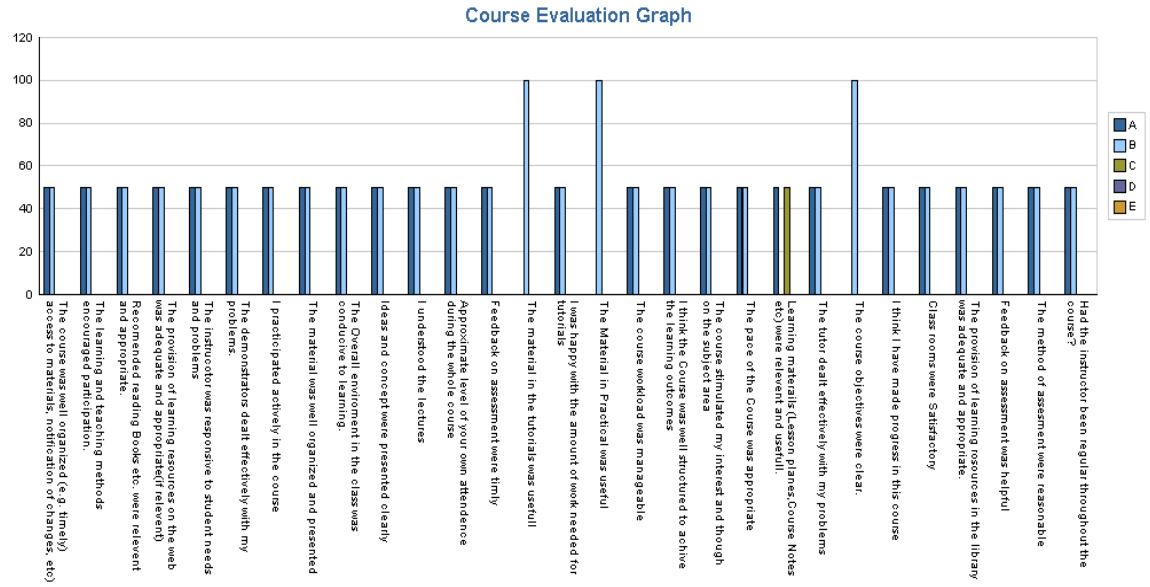


Figure 17. Course Evaluation of WL-732 during Spring-2014

Discussion: The majority of the students were satisfied and termed the course interesting, well organized, with clear objectives. The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

FACULTY COURSE REVIEW REPORT

At the time of completion of each semester, each faculty member, for each course offered during the semester, filled and completed **performa 2** (online on CMS) to compile the Faculty Course Review report. The results and details of the said review report are shown below (Table 4 to Table 9).

PMAS-Arid Ariculture University Rawalpindi

Faculty Course Review Report

Department:	Department of Wildlife Management		
Course Code:	WL-703	Title:	Principles of Wildife Management
Session:	2013	Semester:	
Credit Value:	3(3-0)	Lectures	44
No. of Students:	10	Seminars:	0
Contact Hours:	44		
Assessment Methos:	Mid Term exams=18 assignment=06 Final exams=36		

Distribution of Grade/Marks and other Outcomes

Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	0	0	0	0	0	0	0	0	0	0
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	10	20	20	20	0	0	0	0	0	0

Overview/Evaluation (Course Co-coordinator Comments)

Table 4. Faculty Course Review Report of WL-703 for Fall 2013.

PMAS-Arid Ariculture University Rawalpindi

Faculty Course Review Report

Department:	Department of Wildlife Management		
Course Code:	WL-705	Title:	Wildlife Study Techniques-II: Management Aspects
Session:	Spring2013	Semester:	
Credit Value:	3(2-2	Lectures	32
No. of Students:	15	Seminars:	0
Contact Hours:	64		
Assessment Methos:	Exams Weight-age (Mid, Assignment, Final): a)Theory: 66.67% Mid-Term: 30% Assignments: 10% (Presentations) Final-Term: 60% b)Practical (Final-Term): 33.33%		

Distribution of Grade/Marks and other Outcomes

Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	0	0	0	0	0	0	0	0	0	0
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	15	27	40	20	7	0	0	0	1	15

Overview/Evaluation (Course Co-coordinator Comments)

Table 5. Faculty Course Review report for WL-705 for the semester Spring 2013.

PMAS-Arid Ariculture University Rawalpindi

Faculty Course Review Report

Department:	Department of Wildlife Management		
Course Code:	WL-708	Title:	Wildlife Damage Management
Session:	Spring2013	Semester:	
Credit Value:	3(2-2	Lectures	32
No. of Students:	9	Seminars:	0
Contact Hours:	64		
Assessment Methos:	Exams Weight-age (Mid, Assignment, Final): a)Theory: 66.67% Mid-Term: 30% Assignments: 10% (Presentations) Final-Term: 60% b)Practical (Final-Term): 33.33%		

Distribution of Grade/Marks and other Outcomes

Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	0	0	0	0	0	0	0	0	0	0
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	9	0	67	33	0	0	0	0	0	9

Overview/Evaluation (Course Co-coordinator Comments)

Table 6. Faculty Course Review report for WL-708 for the semester Spring 2013.

PMAS-Arid Ariculture University Rawalpindi

Faculty Course Review Report

Department:	Department of Wildlife Management		
Course Code:	WL 710	Title:	Protected areas and their managemnt
Session:	Fall 2014	Semester:	
Credit Value:	3(3-0)	Lectures	48
No. of Students:	34	Seminars:	0
Contact Hours:	3 per week		
Assessment Methos:	mid exam 18 marks, final exam 36 marks, assignmnet 6 marks		

Distribution of Grade/Marks and other Outcomes

Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	0	0	0	0	0	0	0	0	0	0
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	37	3	21	8	2	0	0	0	3	34

Overview/Evaluation (Course Co-coordinator Comments)

Table 7. Faculty Course Review report for WL-710 for the semester fall 2013.

PMAS-Arid Ariculture University Rawalpindi

Faculty Course Review Report

Department:	Department of Wildlife Management		
Course Code:	WL-713	Title:	Wildlife Food and Foraging
Session:	2014	Semester:	
Credit Value:	3(3-0)	Lectures	43
No. of Students:	8	Seminars:	0
Contact Hours:	43		
Assessment Methos:	Mid Term Exams=18 assignment=06 Final Exam=36		

Distribution of Grade/Marks and other Outcomes

Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	0	0	0	0	0	0	0	0	0	0
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	8	50	38	13	0	0	0	0	0	0

Overview/Evaluation (Course Co-coordinator Comments)

Table 8. Faculty Course Review report for WL-713 for the semester Spring 2014.

PMAS-Arid Ariculture University Rawalpindi

Faculty Course Review Report

Department:	Department of Wildlife Management		
Course Code:	WL-715	Title:	management aspects of wildlife behavior
Session:	2013	Semester:	
Credit Value:	3(3-0	Lectures	48
No. of Students:	18	Seminars:	0
Contact Hours:	3		
Assessment Methos:	Mid term = 18 marks Final = 36 marks Assignments = 6 marks		

Distribution of Grade/Marks and other Outcomes

Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	0	0	0	0	0	0	0	0	0	0
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	18	39	50	6	0	0	0	0	1	18

Overview/Evaluation (Course Co-coordinator Comments)

Table 9. Faculty Course Review report for WL-715 for the semester Spring 2013.

PMAS-Arid Ariculture University Rawalpindi

Faculty Course Review Report

Department:	Department of Wildlife Management		
Course Code:	WL 728	Title:	Wildlife policy, legislation and international conventions
Session:	Spring 201	Semester:	
Credit Value:	3(3-0)	Lectures	48
No. of Students:	0	Seminars:	0
Contact Hours:	3 per week		
Assessment Methos:	mid exam 18 marks, final exam 36 marks, assignmnet 6 marks		

Distribution of Grade/Marks and other Outcomes

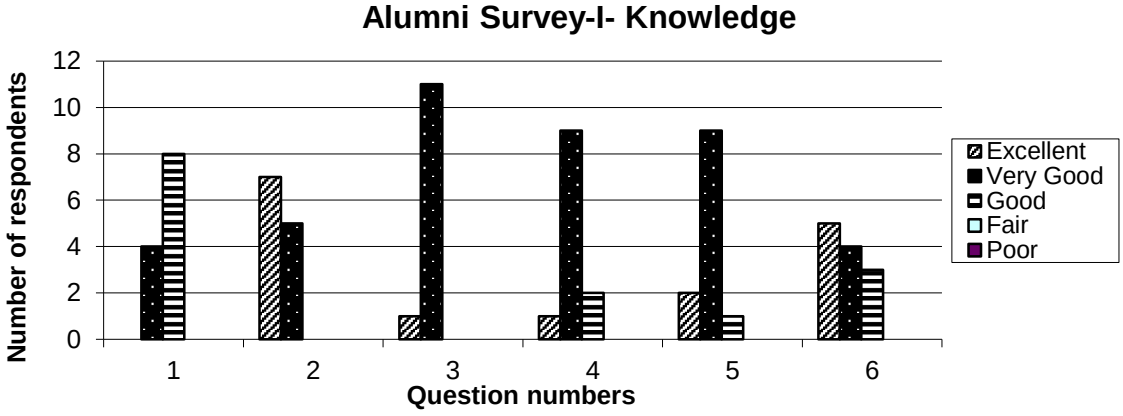
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	0	0	0	0	0	0	0	0	0	0
Undergraduate	Originally Registered	% Grade A	% Grade B	% Grade C	% Grade D	% Grade E	% Grade F	No Grade	Withdrawal	Total
No. of Students	6	1	3	2	0	0	0	0	0	6

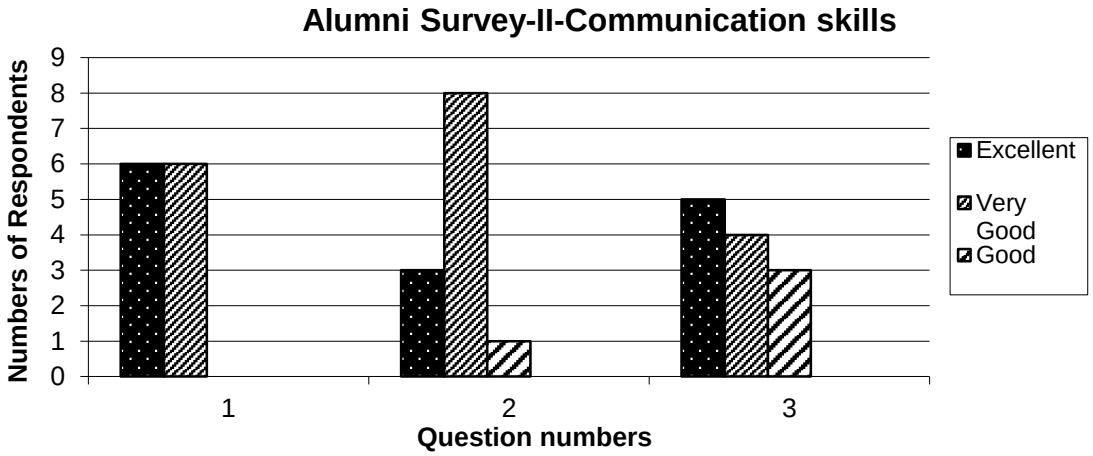
Overview/Evaluation (Course Co-coordinator Comments)

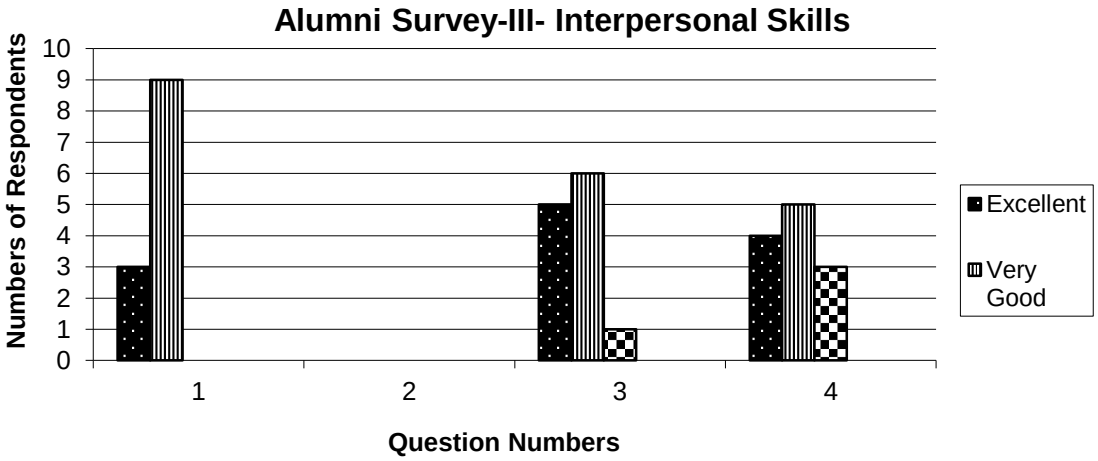
Table 10. Faculty Course Review report for WL-728 for the semester Spring 2014.

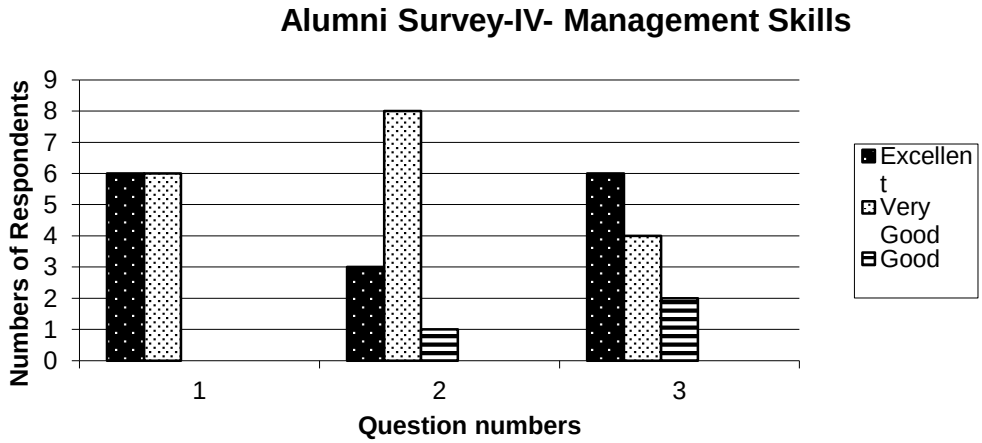
ALUMNI SURVEY RESULTS

Feedback of students graduated duringFall 2012 and Spring 2014 was acquired through **Proforma-7.**Majority of the Alumni have rated the knowledge imparted by the department, communication skills, interpersonal skills and management/ leadership skills and department status as high. Results of the survey are presented below (Fig. 18).









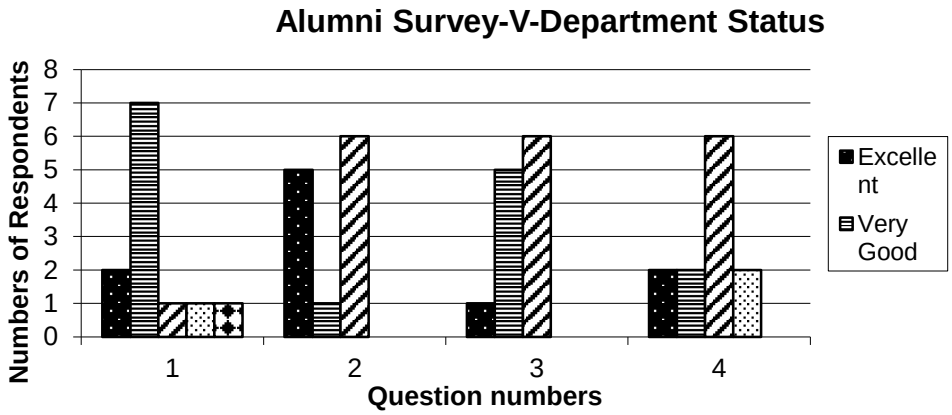


Figure18 (I-V). Results of Alumni Survey in context of knowledge, communication skills, interpersonal skills, management skills of the faculty members and the department's status

SURVEY OF GRADUATING STUDENTS

Survey of graduating students was conducted through **Performa 3**. Students showed satisfaction over program effectiveness for enhancing team work, support for learning, meeting objectives of program and conducive environment for learning. The results of the survey are given in Fig. 19.

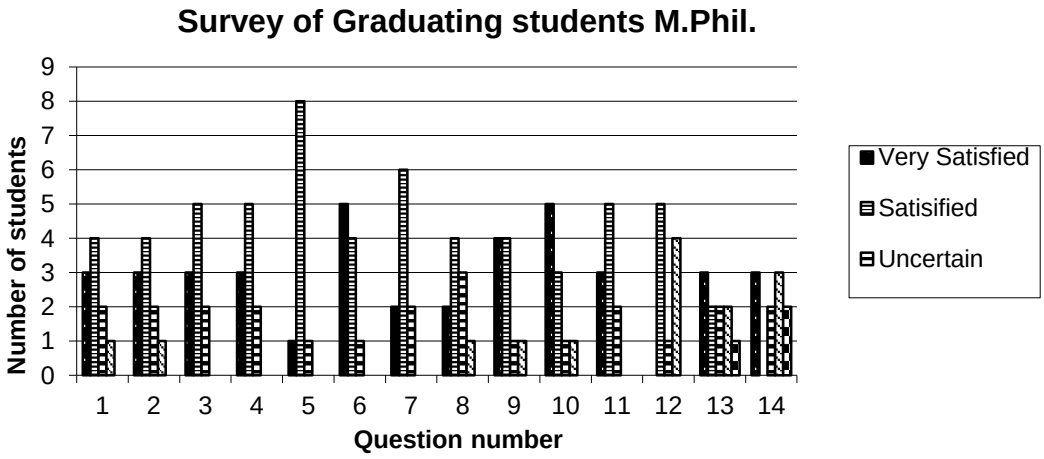


Figure19.Results of the survey of the graduatingstudentsof the department.

Best aspects of the Program:

- Development of better working in the field as a team
- Program is conducive and improved learning skills
- Field visits and wildlife observations
- Confidence building, field work, research and writing abilities
- Understanding importance of natural resources and biodiversity
- Enhanced writing, professional and management skills of wildlife

Aspects of Program in need of improvement:

- More study tours to natural areas for field observations of wildlife species
- Trained field staff and own transport facility
- More research equipment/facilities in laboratories and for field
- More scholarships for the students
- More laboratory space

RESEARCH STUDENTS PROGRESS REVIEW

Survey of M.Phil. research students progress review was conducted through **Performa 4.** Results are given below in graphs.

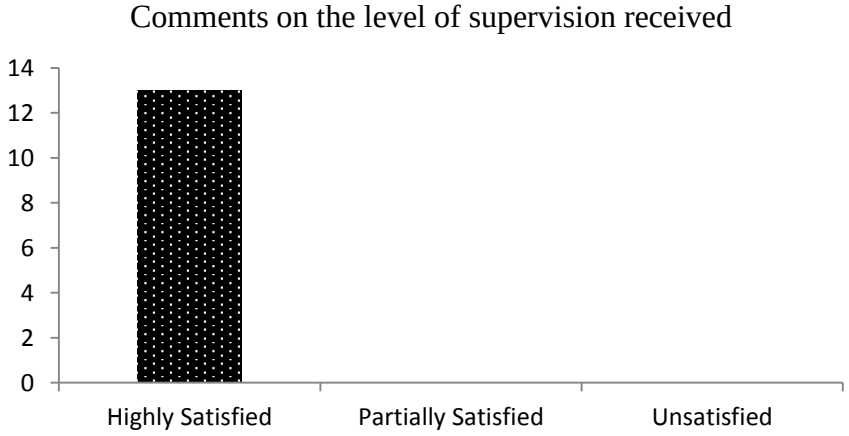


Figure20. Level of supervision received by M. Phil. Students of the department

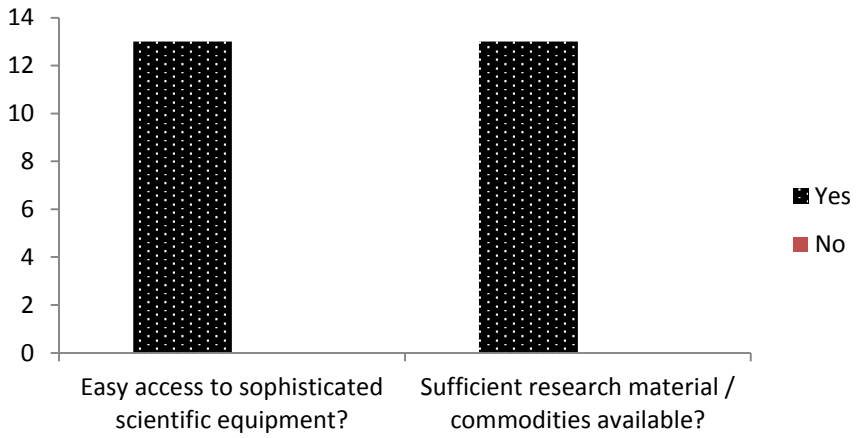


Figure21. Response of M.Phil. students of the department on Misc. issues

Standard 1-3. The results of program's assessment and the extent to which they are used to improve the program must be documented

Regular assessment process will be continued and the results will be incorporated accordingly. Following are the strengths and weaknesses of the program identified.

Strengths of the Program

1. The department is having qualified teachers with full acquaintance of their respective subjects, knowledge of research and management techniques for study of wildlife.
2. Two professors are foreign qualified, two assistant professors; one with Ph.D. degree from Quid-i-Azam University, Islamabad, and other from Karachi University and one lecturer has completed her M.Phil. (Wildlife Management) from PMAS-AAU Rawalpindi and pursuing her Ph.D. in wildlife management.Four faculty members are HEC approved supervisors who can supervise Ph.D. students.
3. All faculty members are involved in research directly or indirectly as supervisor and committee members of post-graduate students.
4. Two faculty members (one assistant professor and one lecturer) have got six months training in wildlife from foreign universities (USA and Malaysia).
5. All faculty members have got research projects funded from various funding sources.
6. Two laboratories have been established with basic necessary equipment in addition to having equipments to carry out field studies on wildlife species.
7. The department has got necessary field and laboratory equipment and class room aids to strengthen academic and research activities of the department.
8. Department has signed MoUs with seven public and private sector organizations to facilitate its research projects and students' theses research.

Weaknesses of the Program

1. There is scarcity of space as there is only one class room due to which department is facing difficulty in adjusting simultaneous classes.
2. One faculty member is housed in cabinin the laboratory due to which working and sitting place (for Ph.D. students) has become insufficient. The laboratories are also filled with equipments. Therefore, at least one faculty office room and one store room are needed to meet the needs.

3. Wildlife is an applied, field-based subject which needs extensive touring for imparting firsthand knowledge to the students and therefore, a suitable field vehicleis needed.
4. Coordination with federal and provincial wildlife departments and other relevant organizations has been developed which needs to be further strengthened for field tours and research studies.

Standard 1-4. The department must assess its overall performance periodically using quantifiable measures.

The evaluation process indicated high efficiency of system and satisfactory impact of outcomes (Table 4).

Table 4. Performance measures for research activities

Faculty	Publications in Journals	Research & Development Projects
Dr. Iftikhar Hussain	13	0
Dr. Maqsood Anwar	13	1
Dr. Tariq Mahmood	14	1
Dr. Muhammad Rais	9	3
Ms. Bushra Allah Rakha	18	2

Future Plans

The Department has planned future research studies to address the issues of wildlife conservation including protected areas management, wetlands and data collection on biology/ecology of wildlife species particularly the threatened species. Some of the salient activities are given in the following;

1. Population density / abundance, habitat association/preference, breeding habits/biology of wildlife species, especially rare and threatened species
2. Food habits, diet composition and food preference of wildlife species, particularly focusing on ungulates, carnivore and threatened bird species.
3. Distribution range/pattern of wildlife species especially focusing on Pothwar area.
4. Baseline data on protected areas including wildlife diversity, threatened or rare species, social issues and major threats to the PAs.
5. Baseline data on wetlands including both resident and migratory waterfowl and threats to the ecosystem.
6. Wildlife damage assessment and management especially of rodent pests, porcupine and wild boar.
7. To impart quality education in wildlife management/conservation through study tours, audio visual aids along with provision of latest literature, journals, books and internet.
8. To impart training to employees of wildlife/forest departments, other relevant organizations and NGOs in wildlife research and management.
9. To develop strong collaboration and linkages with wildlife related government departments and NGOs for wildlife conservation and research.

10. To enhance knowledge and skills of faculty members about latest advancements in wildlife/biodiversity research and conservation through exchange programs, short trainings and collaborative research projects within and outside Pakistan.

Faculty satisfaction regarding the administrative services

- The department maintains a ratio of 4:1 for the academic (including technical) and administrative/support (non-technical) staff which fulfils the standard set by HEC
- Administrative meetings (departmental, university, academic council, and syndicate) are attended as and when required.
- Office matters/files are disposed regularly and so far no complaint has been received from higher administrative authorities.
- Proper records/file of each employee and students are maintained.

Quantitative assessment of the department for the last two years is given in the Table 5.

Table 5. Quantitative assessment of the department (Fall 2012 to Spring 2014)

Sr. #	Particular	No.	Remarks
1	M. Phil. degree awarded	16	
2	Students: Faculty ratio	-	Fulfils HEC criteria
3	Technical: Non-technical Ratio	-	Fulfils HEC criteria

EMPLOYER SURVEY

As there was no graduating student working in the departments by the end of spring semester 2014, the employer survey under Performa 8 was not conducted.

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

A. Intent

All courses for M.Phil were initially developed by faculty members and finalized after sharing with relevant government departments, NGOs, universities and individual experts. During the course of time, a few courses have been revised and some new courses added based on the need felt by the department. Curriculum and course contents are finally approved by the University Academic Council.

B. Definition of credit hour

One credit hour is one theory lecture or two hours laboratory practical per week. A credit hour carries 20 marks.

C. Degree plan - pre-requisites

B.Sc.(Hons.)/B.S. or master degree examination (16 years education in aggregate) with a minimum of 50% marks or its equivalent from a recognized institution in related subjects (Wildlife/Zoology/Biology/Forestry & Range Management) or an equivalent qualification in relevant discipline from a HEC recognized institution.GAT score of 50 is required.

The selection criterion for each course is as follows;

- The course is relevant to the degree program
- It meets the national and international requirements for the degree
- Adequate facilities are available in the department to offer the courses
- The course contents meet the program objectives as highlighted and provided by the Higher Education Commission of Pakistan.

Each course in the program is to be completed for credits specifying the following:

- Course title (WL)
- Course objectives and outcome (Given in course breakdown into lectures separately)
- Catalogue description (yes)
- Text book and reference (Given in course contents)
- Syllabus breakdown in lectures (yes supplied to QEC separately)
- **Computer usage**: Internet facility is used by faculty members to update their knowledge regarding each course, research studies and recent references. Students also use this facility to solve their problems, assignments and presentations.
- **Laboratory facilities** are provided to the students for their practical exercise, given in the curricula. Post-graduate students also use laboratories for their theses research where equipment, material and chemicals are provided.

D. Degree requirements

M. Phil. Wildlife Management

The duration of course for M.Phil. degree shall not be less than four semesters for whole time students and not less than six semesters for part time/partial residents and not more than six and eight semesters, respectively. Each student has to complete 40 credits for the award of degree including 30 credits of course work and 10 of research/thesis/dissertation (not counted towards calculation of CGPA) based on the approved programme of research. All students of M. Phil. degree will be required to pass comprehensive examination after qualifying the course work. The recommendations of HEC regarding compulsory requirements of 124 credit hours for admission in M.S./M. Phil is adopted. List of major courses for M. Phil. is given in Table 6.

Table 6. Course Requirements for M. Phil. in Wildlife Management

Sr. No.	Course No.	Course Title	Credit hours
1	WL-703	Principles of Wildlife Management	3 (3-0)
2	WL-704	Wildlife Study Techniques-I: Biological Aspects	3 (2-2)
3	WL-705	Wildlife Study Techniques-II: Management Aspects	3 (2-2)
4	WL-710	Protected Areas and their Management	3 (3-0)
5	WL-713	Wildlife Food and Foraging	3 (3-0)
6	WL-715	Management Aspects of Wildlife Behavior	3 (3-0)
7	WL-728	Wildlife Policy, Legislation and International Conventions	3 (3-0)
8	WL-719	Special Problem	1 (1-0)
9	WL-720	Seminar-I	1 (1-0)
10	WL-732	Wildlife Data Analysis	3(2-2)

Standard 2-1. The curriculum must be consistent and support the program's documented objectives.

The curriculum of Department is consistent with the program objectives (Table 7).

Table 7. Courses with relation to their outcomes

Course	Objectives		
	HRD	**Priority of Research**	**Integrated approaches**
Wildlife management/ conservation	++ +	++	+ +++
Wildlife study/ management techniques	+ + +	++ ++	+ + + +
Wildlife ecology	+ +	+ + +	+ + +
Wildlife biology	+ +	++	+ +
In-situ conservation	++	++	++
Ex-situ conservation	+	+	+
Policy/law/social issues	+	+	+ +

+ = Relevant, ++ = Relevant & satisfactory, + + + =Very relevant & satisfactory,
+ ++ + = highly relevant & highly satisfactory

Assessment of the Department of Wildlife Management Curriculum

The assessment of curriculum is given in Table 8above and the courses are cross tabulated according to the program outcomes.

1. The curriculum fits very well and satisfies the core requirements for the program, as specified by the respective accreditation body.
2. The curriculum satisfied the general arts and professional and other discipline required for the program according to demands and requirements set by the Higher Education Commission.

Standard 2.2. Theoretical background, problem analysis and solution design must be stressed within the program's core material

Table 8. Courses representing theoretical background, problem analysis and solution design

Elements	Courses	Title of Courses
Theoretical Back-ground	WL-713	Wildlife Food and Foraging
	WL-723	Wildlife Eco-toxicology
	WL-725	Museum Science
Problem Analysis	WL-710	Protected Areas and their Management
	WL-704	Wildlife Study Techniques-I: Biological Aspects
	WL-705	Wildlife Study Techniques-II: Management Aspects
	WL-721	Wildlife Habitat Evaluation and Restoration
	WL-719	Special Problem
	WL-727	Capture, Care and Transportation of Wildlife
	WL-728	Wildlife Policy, Legislation and International Conventions
Solution Designs	WL-703	Principles of Wildlife Management
	WL-715	Management Aspects of Wildlife Behavior

	WL-717	Endangered Species and their Management
	WL-720	Seminar
	WL-722	Predator Ecology and Management
	WL-724	Wildlife Diseases and their Management
	WL-730	Captive Breeding and Assisted Reproduction in Wildlife
	WL-731	Wildlife Farming and Ranching
	WL-732	Wildlife Data Analysis

Standard 2-6. Information technology component of the curriculum must be integrated throughout the program

During curriculum development, all aspects of information technology were considered and after a critical analysis, relevant aspects were integrated into the program. Two courses of statistics (6 credit hours) based on computer practical were included in the curriculum to fulfill the requirements of the students.

Standard- 2.7. Oral and written communication skills of the student must be developed and applied in the program.

- Two seminars each of one credit hour are compulsory for students.
- Special problem (one credit hour) is offered to the students which require writing a comprehensive report on a topic and presenting it in the class.
- Assignments are given to all students in each course on specific titles relevant to the course which are presented orally and given as written assignments by the students which improve their oral and written communication skills.

CRITERION 3. LABORATORIES AND COMPUTER FACILITIES

- Laboratory Title: Wildlife Management Laboratory -1
  WildlifeManagement Laboratory-2
- Location and Area: Faculty of Forestry, Range Management and Wildlife, Ground and 1st Floor of Spur-D, Main Academic Block.
- Objectives: Laboratories are used by students and faculty for research studies including; autopsy of animals, micro-histological studies and food/diet composition analysis studies.

Research work for the graduate and post-graduate students

- Adequacy for instructions: Laboratories meet the requirements in terms of equipment, chemicals, furniture and general facilities, however, not spacious enough for demonstration purposes and analysis studies.
- Major apparatus: Major equipments available in the Laboratories include; microscopes, deep freezers, refrigerators, pH meters, electric balances, electric oven, slides, glass ware, centrifuge machine, spectrophotometer, tissue homogenizers, and equipment for histological studies of the animal tissuesetc. purchased from HEC funded research& development projects.

- Field Equipments: Binoculars, GPS, Cameras, Cages, live traps, spotting scopes, spring balances,camping gear, etc.
- Safety Regulations: Safety measures such as fire extinguishers, first aid kit are not available in the Labs. However, the University maintains a Medical Dispensary for minor incidents.

Standard 3.1. Laboratory manuals/documentation/instructions for experiments must be available and readily accessible to faculty and students.

Laboratory manuals of each subject are not available in the departmental library. However, books and manuals owned by individual faculty are used by the students. A number of books and manuals have been prepared in the department.

Standard 3.2. There must be adequate support personnel for instruction and maintenance of laboratory

Laboratories are maintained by two laboratory attendants and one laboratory assistant who assist the students in research studies, practical, cleaning and washing, etc. Students are instructed for Lab. work by respective faculty members.

Standard 3.3. The university computing infrastructure and facilities must be adequate to support program's objectives

The University has limited computer facility for students. Computer facility is available at the department level to most of faculty members independently. However, it is not adequate to meet the objectives of the programme and needs improvement

CRITERION 4. STUDENT SUPPORT AND GUIDANCE

Directorate of Students Affairs of the University organizes support programs, cultural activities for students and guides them in case of any problem. The university staff provides information regarding admission, scholarships, career opportunities, etc. The university arranges orientation programme for new students and guided tours to various departments. However, currently Parent/Teacher association in the university does not exist.

Standard 4.1. Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner.

- Courses are taught as per strategy and guidance provided by HEC.
- Subject courses are offered as per scheme of study of the department after approval of Academic Council of the university. Courses are offered by faculty trained in the relevant subject and as per their availability.
- Elective courses and minor courses are offered as per policy of HEC and University.

Standard 4.2. Courses in the major must be structured to ensure effectiveinteraction between students, faculty and teaching assistants.

- Courses are structured and decided among the faculty members in the departmental board of study meeting.
- Courses to be offered are decided before the commencement of semester and the faculty members interact frequently among themselves and with students.
- Students are encouraged to ask question, give comments and take part in the discussions in the class.

- Emphasis is given on effective interaction between the students and between students and teachers.

Standard 4.3. Guidance on how to complete the program must be available to all students and access to qualified advising must be available to make course decisions and career choice.

- Students are informed about program requirements through office of chairperson of the department and through personal communication of teachers with them.
- The counseling of students is continuous process and students are free to contact relevant teachers whenever they face any professional problem.
- Students are also facilitated for interaction withfaculties/scientists in other universities and research organizations whenever they need and there is open option for the students to get membership of professional societies.

CRITERION5. PROCESS CONTROL

Standard 5.1. The process by which students are admitted to the program must be based on quantities criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

- The process of admission is well established and followed as per rules and criterion set by University for post graduate students of M.Phil.
- Admission criteria for M Phil. program: M.Sc. in relevant field/subjects with GAT score of 50.
- All these entries are based on the recommendations of admission committees.
- Admission criteria is revised when required before the announcement of admissions.

Standard 5.2. The process by which students are registered in the program and monitoring of students progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

- Registration of students is done once every year at the time of admission. When a student is admitted for each degree, he/she is evaluated through the result of each course for each semester. If the students fulfill the criteria of the University (a specific CGPA after each semester) they are promoted to the next semester.
- Students are evaluated through Mid, Final and Practical exams and through written assignments and oral presentations.
- In general, the students are registered on competition bases keeping in view the academic and research standards.

Standard 5.3. The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institution mission statement. These processes must be periodically evaluated to ensure that it is meeting with its objectives.

- The University follows the recruitment policy and rules recommended by HEC.
- Posts are advertised in national newspapers and university website, and applicants are short-listed on the basis of experience, qualification, publications and other qualities / activities as fixed by the University

- The candidates are interviewed by the University Selection Board and principal and alternate candidates are selected.
- Selection of candidates is approved by the Syndicate for issuing orders to join within a specified period.
- Induction of new candidates depends upon the number of approved vacancies.
- Recently, Tenure Track System (TTS) has been introduced by the University which is a good incentive for retaining highly qualified faculty members.
- HEC also supports appointment of highly qualified members as foreign faculty professor, national professors and deputes them in various departments.

Standard 5.4. The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives.

- Periodical update of curriculum is done depending upon the requirements, innovations and new knowledge generated.
- New courses are developed and included in the curriculum when need arises.
- Books on various aspects of wildlife are available in the department and in University library where documentation, photocopying and internet facilities are also available. .
- Students also take notes during the classes and photocopies of slides/transparencies are also provided in addition to printed material.
- All efforts are made to impart the course material and knowledge to meet the objectives of the curriculum.

Standard 5.5. The process that ensures that graduates have completed the requirements of the program must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.

In the examination system of the University, the following are clearly mentioned;

- The evaluation procedure consists of quizzes, mid and final examinations, practical, assignments, reports and oral presentations.
- The controller of examinations announces the dates of examinations. After each semester, the controller office notifies results of the exams.
- The minimum passing marks for each course is 40% for M.Phil. in theory and practical, separately.
- In theory, division of each component of examination is as under:

Mid Examination	30%
Assignments	10%
Final Examination	60%

- Grade points are as follows

Marks	**Grade**	**Grade point**	**Remarks**
80-100 %	A	4	Excellent
65-79 %	B	3	Good
50-64 %	C	2	Satisfactory
40-49 %	D	1	Pass
Below 40 %	F	0	Fail

- Gold medals are awarded to the students who secure highest cumulative marks in each department. Degrees are awarded to the students in the convocation which is held every year.

CRITERION 6. FACULTY

Standard 6-1. There must be enough full time faculty who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline.

Currently, there are five full time faculty members out of which four are Ph.D. and one M.Phil. in wildlife management. The fields of specialization of faculty members include; wildlife management/conservation, wildlife study/management techniques, wildlife ecology, wildlife biology, in-situ conservation, ex-situ conservation and policy/law/social issues (Table 9).

Table 9. Faculty distribution by program area in wildlife management

S. No.	Area of specialization	Relevant Courses	Number of faculty members	Number of faculty with Ph.D. degree
1	Wildlife management/ conservation	7	4	4
2	Wildlife study/management techniques	4	4	4
3	Wildlife ecology	3	5	3
4	Wildlife biology	7	5	3
5	In-situ conservation	4	3	4
6	Ex-situ conservation	5	2	3
7	Policy/law/social issues	3	2	3

Standard 6-2. All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place.

- In each semester courses are offered according to work load of faculty members
- Division of students for supervision is made on the basis of faculty expertise/research interests

Existing faculty development programs at department and university level

- Faculty members attended conferences/workshops/seminars outside and within university.
- Laboratory, library and internet facilities are available for scholarly work and academic improvement
- Support for attending conferences lead to enhancement of research initiatives.

- All faculty members got financial support for research projects from HEC and university-funded program specifically designedfor junior faculty members.

Standard 6-3. All faculty members should be motivated and have job satisfactionto excel in their profession

The young faculty is mobilized by timely back up and appreciation by the senior faculty members. Avenues for research funding are provided to them through university research programme.There are programs and processes in place to attract good faculty members e.g. teaching and research awards annually, reasonable teaching load and class size, social activities and better salary package.

Results of the faculty survey

Results of faculty survey (Performa 5) are summarized in Fig.22. The teachers generally showed satisfaction over most of parameters. However, level of monitoring, cooperation with colleagues and the cooperation of teachers needs to be improved.

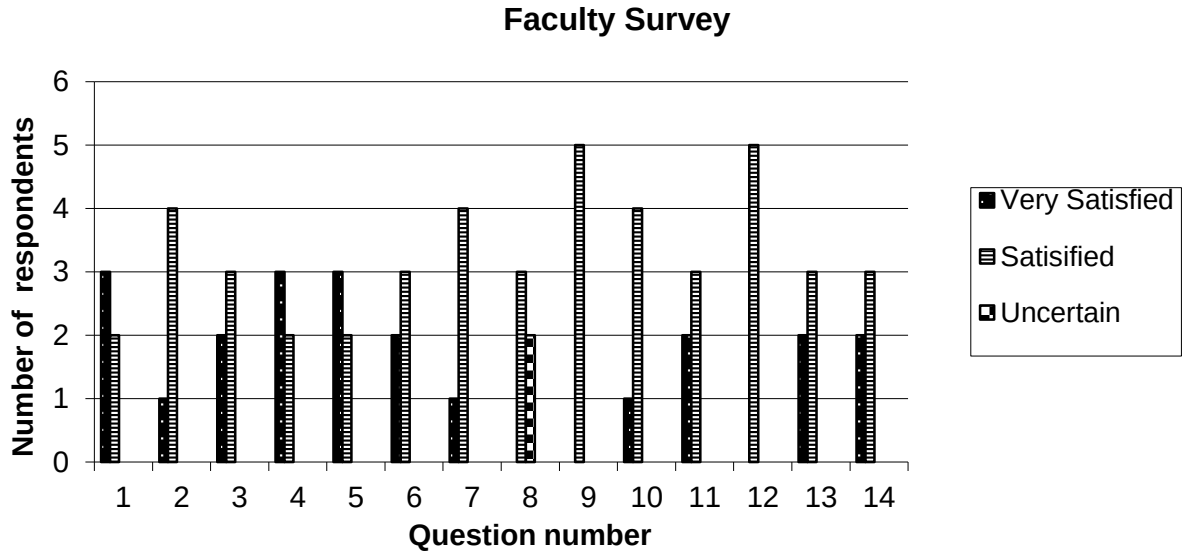


Figure22. Results of faculty survey

Best Program Features:

- Supervision of students for research
- Cooperation from colleagues
- Conducive environment at the department
- Teaching and research together
- Funds for research projects

Programs that could improve your motivation:

- More computer and internet facilities for students
- Opportunities for improving teaching skills and knowledge

CRITERION7. INSTITUTIONAL FACILITIES

Standard 7.1. The institution must have the infrastructure to support new trends in learning such as e-learning. Supportive Infrastructure and Facilities in learning:

a. Two well-equipped laboratories and one class room with teaching aids(multimedia, over head projector) and number of books are available in the department.
b. However, more sitting place for faculty members and Ph.D. students with computer and internet facility is desired tomake working/research/study environment conducive for higher learning.

Standard- 7.2. The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.

- Central library has been recently up-graded with provision of computer and internet facility to the post-graduate students.
- The department is regularly suggesting to the central library for provision of new books related to wildlife sciences.
- The department under its HEC funded project,has purchased more than 270 books in the area of wildlife studies.
- Only a small number of scientific journals are available in the central library; even PakistaniJournals are not available. Provision of major journals related to wildlife is highly desired for research and scientific/technical writing.

Standard- 7.3. Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.

There is only one classroom with the department which possesses proper teaching facilities such as multimedia projector and overhead projector. Classroom is inadequate for all classes. Sometimes classes are taken in the laboratories. Similarly, space for faculty offices is not appropriate and two faculty members are housed in the cabins built inside the Labs. This makes Lab. space insufficient for practical and research use by the students.

CRITERION 8. INSTITUTIONAL SUPPORT

The university administration is making all possible efforts for strengthening the existing departments by attracting highly qualified faculty and by getting financial support through R&D Project.

Standard 8-1. There must be sufficient support and financial resources to attractand retain high quality faculty and provide the means for them tomaintain competence as teachers and scholars.

There is no proper maintenance/documentation and attractive investment of GPF deducted from salary of the employees. Similarly, no benefit/welfare from BF deduction is available to the faculty except a meager benefit for faculty children's education at university level. Similarly, little attention is being paid for faculty residential facilities at university campus and majority of faculty members remain on waiting list for a long period. Transport facility is

not frequently and easily available for field works/touring. Department budget is too low to meet expenses and only Rs. 50,000/- were allocated for the year 2012-13 and 2013-14 for office and Lab. expenses including student research. However, the department can get chemicals, glassware, stationery and other office use items from central stores of university by submitting special request.

Technical Staff: Civil Works and internet networking departments are very slow in response. Financial and accounting departments are also slow in their delivery.

Office equipment: Sufficient office equipment is available to meet the current teaching and research activities of the department.

Standard 8-2. There must be an adequate number of high quality graduate students, research assistants and Ph.D. students.

The admission of M.Phil.studentsis held once a year. A strict merit policy is applied for admission and GAT for M.Phil. Detail of students enrolled during last two years is given in Table 10.

Table 10.Enrollment in M.Phil.degree programin 2012 and 2013

Year	Number of M.Phil. students
2012	18
2013	7
Total	25

Standard- 8.3. Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities.

An amount of about Rs. 50,000/- per annumis provided to the department which is too low to maintain and run the departmental activities.

SUMMARY AND CONCLUSIONS

The Department of Wildlife Management at PMAS-Arid Agriculture University, Rawalpindi was established in 2007 with a mandate to carry out teaching and research in wildlife for its conservation in the country, particularly in Pothwar region. There are five faculty members out of them four having doctoral degrees and three are HEC approved supervisors. The courses have been prepared keeping in view the latest developments in wildlife management and conservation. The department is offering M.Sc., M. Phil. and Ph.D. in wildlife management. During the report period25students in M. Phil.were enrolled. The department has published 49 research papers during the period under report.

Basic equipment for field surveys of wildlife and its habitats has been procured through various funding sources which include binoculars, spotting scopes, global positioning system (GPS), camera, telemetry equipment, camping gear, etc. Two laboratories have been established with basic necessary equipment for micro-histological, taxonomy, food habit studies and food/diet composition. More than 200 latest books on the subject of wildlife/biodiversity have also been purchased and placed in the main library and in the department for ready reference to the students.

Young faculty members have got six research projects from the university funding programme while senior faculty has earned three research projects from HEC. The departmental reaching and research capacity has been enhance through PSDP/HEC funded project titled "Strengthening of Department of Wildlife Management" amounting to Rs. 36.141 m. Research studies currently being conducted focus on wildlife population density and size, wildlife habitat analysis, food habits and diet composition, breeding habits and breeding biology, distribution patterns, data on protected areas and threatened species, wetland ecology, population trends of water birds, threats to wildlife species, wildlife damage assessment and management, etc.

Proper steps are taken to guide the students for programme requirements, communication, meetings, study tours, students-teacher interaction, etc. They are well informed of relevant scientific societies, job opportunities and other such activities. University and HEC rules and guidelines are followed for process control covering admission, registration, recruiting policy, courses and delivery of material, academic requirements, performance and grading.

Curriculum design, development and organization is based upon approved criteria. Pre-requisites are fully observed, examinations are conducted as per schedule, academic schemes are prepared and courses for each semester are developed. Their efficacy was found to range between satisfactory to highly satisfactory. Self assessment report has shown programme outcomes as satisfactory. Teachers' evaluation and course evaluation by the students' revealed highly satisfactory standards. Faculty survey results were variable but with overall satisfactory rating. Graduating students also showed their satisfaction over the knowledge being provided and research studies conducted about wildlife management in the department.

Performance of the department could be improved considering the following points.

1. There is need for refresher courses for teachers pertaining to teaching methodology, education psychology, research and developments and evaluation of students.

2. Professional and behavioral training of support staff will improve their abilities for enhancing the quality of research and teaching.
3. Advance laboratory equipments are needed to carry out molecular/DNA analysis in food habits and species verification.
4. Department budget may be increased to fulfill its requirements for purchase of chemicals, glassware and other items required for conducting of research.
5. The department is in dire need of office rooms for two faculty members, one store room, one library room, one class room and one laboratory room.
6. Regular provision of transport facility for field visits is highly desired.

Thanks

Program Team Members

1. **Prof. Dr. Maqsood Anwar (Coordinator)**
2. **Dr. Tariq Mahmood (Member)**
3. **Dr. Muhammad Rais (Member)**

Annexure-I

1. CURRICULUM VITAE

Personal Data

Name: DR. IFTIKHAR HUSSAIN
Present Position & Address: Professor & Chairman; Department of Wildlife Management, Faculty of Forestry, Rangeland and Wildlife, PMAS-Arid Agriculture University, Rawalpindi-46300
Telephone: 051-9291021
E-mail: ifthussain@edu.com.pk

Academic Qualification

Degree	Year	Institution/University	Subjects
Ph.D.	1998	University of Reading, UK.	Rodent Management
M.Phil.	1990	Quaid-i-Azam University, Islamabad.	Endocrinology
M.Sc.	1979	University of Punjab, Lahore	Zoology
Post-Graduate Diploma	1986	Karachi University, Karachi	Statistics

Publications during 2012-2014

1) **Hussain, I.**, A. Nisa and S. Khalil. 2012. Population Biology of Grey Francolin (*Francolinuspondicerianus*) in Agro-Ecosystem of Pothwar Plateau, Pakistan. *Chinese Birds*, 3(2):91-102 China, DOI 10.5122/cbirds.2012.0009 (*Citation: **1***).

2) Rais, M., S. Baloch, J. Rehman, M. Anwar, **I. Hussain** and T. Mehmood. 2012. Diversity and conservation of amphibians and reptiles in north Punjab, Pakistan. *The Herpetological Bulletin* (UK), 122:16-25 (*Citation: **1***).

3) Mushtaq. M., **I. Hussain**, A. Mian, S. Munir, I. Ahmad and A.A. Khan. 2013. Field evaluation of some bait additives against Indian crested porcupine, *Hystrix indica* Kerr (Rodentia: Hystricidae). *Integrative Zoology*, 8: 285-292. DOI:10.1111/1749-4877.12014 (IF: **1.0,** *Citation: **3***).

4) Bilal, S., M. Rais, M. Anwar, **I. Hussain**, M. Sharif and B. Kabeer. 2013. Habitat association of Little Grebe (*Tachybaptusruficollis*) at KallarKahar Lake, Pakistan. *Journal of King Saud University-Science*, 25:267–270.

5) **Hussain, I.**, S. Abbasi, S, N. Mirza, M. Anwar, M. Rais, T. Mahmood. 2013. Tree cavities and associated vertebrate fauna in coniferous forest of Dhirkot, Azad Jammu and Kashmir part of Pakistan. *Turkish Journal of Zoology*, 37: 647-658. doi:10.3906/zoo-1209-32. (**IF: 0.591)**

6) Sarwar, M., **I. Hussain**, A. Khan and M. Anwar. 2013. Diet composition of demoiselle crane (A*nthropoidesvirgo*) migrating through LakkiMarwat area of Pakistan. *Avian Biology Research*, 6(4): 269-274. **DOI:**http://dx.doi.org/10.3184/175815513X13802893287049**IF: 0.674**, *Citation: **1***).

7) Rakha, B.A., **I. Hussain**, S. Akhtar, N. Ullah, S.M.H. Andrabi and M.S. Ansari. 2013. Evaluation of Tris–citric acid, skim milk and sodium citrate extenders for liquid storage of Punjab Urial (*Ovisvigneipunjabiensis*) spermatozoa. *Reproductive Biology*, 13: 238-242. http://dx.doi.org/10.1016/j.repbio.2013.06.004(**IF: 1.222**, *Citation: **1***).

8) Ashraf, N., M. Anwar, **I. Hussain** and M.A. Nawaz. 2014. Competition for food between the markhor and domestic goat in Chitral, Pakistan. *Turkish Journal of Zoology*, 38: 191-198. doi:10.3906/zoo-1306-6. (**IF: 0.591**, *Citation: **1***)

9) Rais, M., J. Rehman, S. Baloch, S. M. Ali and **I. Hussain**. 2014. On the herpetofauna in LoiBher Wildlife Park, Rawalpindi, Pakistan. *TAPROBANICA*, 6(1): 56–58.
10) Mushtaq, M., **I. Hussain** and A. Mian. 2012. Effectiveness of groundnut-maize bait as carrier of coumatetralyl against Indian crested porcupine, *Hystrix indica* Kerr. *Pakistan Journal of Zoology*, 44(2):579-581. *(IF: **0.338,** Citation: **2**)*.
11) Mahmood, T., R. Hussain, M. Rais, **I. Hussain** and M.S. Nadeen. 2012. Habitat analysis and population estimates of three falcon species, Red-headed Merlin (*Falco chicauera*), Common Kestrel (*Falco tinnunculus*) and Saker Falcon (*Falco cherritg*), inhabiting district Chakwal, Pakistan. *Pakistan Journal of Zoology*, 44(3):787-798. (*IF: **0.338***).
12) Khan, A.A., S. Munir and **I. Hussain**. 2012. Evaluation of in-burrow baiting technique for control of rodents in groundnut crop. *Pakistan Journal of Zoology*, 44(4):1035-1039. (*IF: **0.338***)
13) Mehmood, A., M. S. Ansari, S. Akhter, A. A. Khan, **I. Hussain**, Shams-ul-Hassan, T. Z. Qureshi and B. A. Rakha. 2012. Occurrence of pathogenic bacteria in small mammals-inhabiting poultry aarms of Rawalpindi/Islamabad, Pakistan. *Pakistan Journal of Zoology*, 44 (4): 1185-1187 *(IF: **0.338**, Citation: **1**)*.

****

2. CURRICULUM VITAE

Personal Data

Name: Dr. MAQSOOD ANWAR
Present Address: Professor,Department of Wildlife Management, PirMehr Ali Shah Arid Agriculture University, Murree road, Rawalpindi, Pakistan.
Telephone 0334-5434784
E-mail maqsoodanwar@uaar.edu.pk

Academic Qualification

Degree	Year	Institution	Specialization
Ph.D.	1989	Utah State University, Logan Utah, USA	Wildlife Science
M.Sc.	1982	University of Agriculture, Faisalabad, Pakistan	Zoology
B.Sc.	1978	Punjab University, Lahore, Pakistan	Biological Sciences

Publications during 2012-2014

1. Nasra Ashraf, **Maqsood Anwar**, Iftikhar Hussain and Muhammad Ali Nawaz. 2014. Competition for food between the markhor and domestic goat in Chitral, Pakistan. Turk J. Zool., 38: 191-198.(**IF: 0.591**, *Citation: **1***)
2. Sajida Noureen, Muhammad Sajid Nadeem,Mirza Azhar Beg and **Maqsood Anwar.**2014. Seasonal variation in the reproductive tract of the Indian flying fox, *Pteropusgiganteus*(Brünnich, 1782). Anim. Bio., 64: 343–364.
3. Muhammad Kabir, Muhammad Siddique Awan and **MaqsoodAanwar**. 2013. Distribution status of common leopard (*Panthera pardus*) in and around Machiara National Park, Azad Jammu and Kashmir. Int. J. Cons. Sci., 4(1):3-12.
4. Noman Khalique, Muhammad Rais, Tariq Mehmood, **Maqsood Anwar**, Sakhawat Ali, Sadia Bilal, Bilal Kabeer. 2012. Study on some waterfowls of Mangla Dam, Azad Jammu and Kashmir. Беркут 21(1-2): 44 – 49.

5. MisbahSarwar, Iftikhar Hussain, Ahmad Khan and **Maqsood Anwar**. 2013. Diet composition of the Demoiselle Crane (*Anthropoidesvirgo*) migrating through LakkiMarwat, Pakistan. Avian Bio. Res., 6(4): 2013.(**IF: 0.674**, *Citation: **1**).*
6. Sara Shabbir, **Maqsood Anwar**, Iftikhar Hussain and Muhammad Ali Nawaz. 2013. Food habits and diet overlap of two sympatric carnivore species in Chitral, Pakistan. J, Anim. Plant Sci., 23(1):100-107. **(Impact factor=0.638)**
7. Baseer u Din Qureshi, **Maqsood Anwar**, Iftikhar Hussain and Mirza Azhar Beg. 2013.Habitat utilization of Himalayan Musk deer (M*oschuschrysogaster*) in the Musk Deer National Park Guraiz, Azad Jammu and Kashmir, Pakistan. J. Anim. Plant Sci., 23(5): 2013: 1366-1369.**(Impact factor=0.638)**
8. Muhammad Rais, Sara Baloch, JeveriaRehman, **Maqsood Anwar**, Iftikhar Hussain and Tariq Mahmood. 2012. Diversity and Conservation of Amphibians and Reptiles in North Punjab, Pakistan.Herpeto. Bulletin. 18:16-25.
9. Iftikhar Hussain, Sajid Abbasi, SarwatNaz Mirza, **Maqsood Anwar**, Muhammad Rais and Tariq Mahmood. 2013. Tree cavities and associated vertebrate fauna in a coniferous forest of Dhirkot, Azad Jammu and Kashmir part of Pakistan. Turk. J. Zool., 37: 647-658. (**IF: 0.591**
10. Sadia Bilal, Muhammad Rais, **Maqsood Anwar**, Iftikhar Hussain, Madiha Sharif and Bilal Kabeer. 2013. Habitat association of Little Grebe (*Tachybaptusruficollis*) at KallarKahar Lake, Pakistan. J. King Saud Univ. – Sci., 25(3):267-270.
11. **Anwar**, M., M. Arshadullah, A. S. Rana and S. Maqsood. 2012. Evaluating the performance of Australian annual medics in sub-tropical and sub-humid ecological zones of Pakistan. Pak. J. Agri. Sci., 49(2):185-188.**(IF: 1.24)**
12. Arshadullah,M., **M. Anwar,** S. N. Mirza and M. Rasheed. 2012. Forage production and nutritional quality of grasses in mesic climate of Pothwar plateau, Rawalpindi. J. Anim. Plant Sci, 22(3):781-784. **(Impact factor=0.638)**
13. Qamar, Z. Q., U. Ali, R. A. Minhas. N. I. Dar and **M. Anwar.**2012. New Distribution Information on Woolly Flying Squirrel (*Eupetaurus cinereus*Thomas, 1888) in Neelum Valley of Azad Jammu and Kashmir, Pakistan. Pak. J. Zool., 44(5):1333-134. **(IF: 0.309)**

****

3. Curriculum Vitae

Personal Details:

Name: **Dr. Tariq Mahmood**

Present position and Address: Assistant Professor, Department of Wild life Management,PMAS Arid Agriculture University, Rawalpindi 46300, Pakistan

Contact No. Cell #: 0313-5307794; Office: 051-9291021

E-mail address: tariqjanjua75@uaar.edu.pk.

Academic Qualification:

Degree	Year	Subject	Institution
Ph.D.	2009	Animal Physiology	QAU Islamabad
M.Phil.	2002	Animal Physiology	QAU Islamabad
M.Sc.	1994	Zoology	PU Lahore

List of Publications 2012-2014

1. **Tariq Mahmood**, NausheenIrshad, and Riaz Hussain. **2014**. Habitat preference and population estimates of Indian pangolin (*Manis crassicaudata*) in district Chakwal of Potohar Plateau, Pakistan. Russian Journal of Ecology, 45(1): 70-75. **(Citation: 01) (IF: 0.236)**
2. Muhammad Awais, Shabbir Ahmed, Sajid Mahmood, Azhar Mahmood, Shaukat Ali, Komal Bibi and **Tariq Mahmood.2014.**Nest Density, Clutch Size and Egg Traits of House Crow *Corvussplendens* at Ghazikot Township, Mansehra, Pakistan.The Journal of Zoology Studies. 1(5): 13-18. **(IF: 0.31)**
3. Muhammad Sajid Nadeem, **Tariq Mahmood,** Muhammad Mahmood-ul-Hassan. **2014**. Breeding success of the Stone Curlew *Burhinusoedicnemus*in Nag Valley (1999–2001), Kharan, Pakistan. Turkish Journal of Zoology**,**.38: 510-514.**(IF: 0.414).**
4. Iftikhar Hussain, Sajid Abbasi, SarwatNaz Mirza, Maqsood Anwar, Muhammad Rais, **Tariq Mahmood. 2013.** Tree cavities and associated vertebrate fauna in a coniferous forest of Dhirkot, Azad Jammu and Kashmir part of Pakistan. Turkish Journal of Zoology,37: 647-658. **(IF: 0.414)**
5. ShaguftaNighat, Shahid Iqbal, Muhammad Sajid Nadeem, **Tariq Mahmood** and Syed Israr Shah. **2013**. Estimation of heavy metal residues from the feathers of Falconidae, Accipitridae and Strigidae in Punjab, Pakistan. Turkish Journal of Zoology, 37(4): 488-500. **(Citations: 02) (IF: 0.414)**
6. **Tariq Mahmood**, Syed Muhammad Usman-ul-Hassan, Muhammad Sajid Nadeem and Amjad Rashid Kayani.**2013**. Population and Diet of migratory Common Starling *Sturnus vulgaris* wintering in agricultural areas of Sialkot district, Pakistan. The Forktail,29: 143-144.
7. Muhammad Rais, Sara Balouch, JaveriaRehman, Maqsood Anwar, Iftikhar Hussain and **Tariq Mahmood. 2012**.Diversity and Conservation of amphibians and reptiles in north Punjab, Pakistan. Herpetological Bulletin. 122: 16-25.
8. Muhammad Sajid Nadeem, Ruqqya Naz, Syed Israr Shah, Mirza Azhar Beg, Amjad Rashid Kayani, Muhammad Mushtaq and **Tariq Mahmood. 2012.** Season- and locality-related changes in the diet of Asiatic Jackal (*Canis aureus*) in Potohar, Pakistan. Turk. J. Zool. 2012. 36: 798-805. **(Citation: 01)** (**IF: 0.414)**
9. Noman Khalique, Muhammad Rais, **Tariq Mehmood,** Maqsood Anwar, Sakhawat Ali, Sadia Bilal, Bilal Kabeer. **2012**. Study on Some waterfowls of mangla dam, Azad Jammu and Kashmir. BERKUT. 21(1-2): 44-49.
10. **Tariq Mahmood,**KhalidaJabeen. Iftikhar Hussain and Amjad Rashid Kayani. **2013**. Plant species association, burrow characteristics, and the diet of Indian pangolin *Manis crassicaudata* in the Potohar Plateau, Pakistan**. Pakistan Journal of Zoology**, 45(6):1533-1539.**(IF: 0.309)**
11. **Tariq Mahmood**, FouziaNiazi, and Muhammad Sajid Nadeem. **2013**."Diet composition of Asiatic jackal (*Canis aureus*) in Margallah Hills National Park, Islamabad, Pakistan". The JAPS. 23(2): 444 – 456.**(IF: 0.638)**
12. **Tariq Mahmood,** Riaz Hussain,NausheenIrshad,FarazAkrim and Muhammad Sajid Nadeem. **2012**. Illegal Mass Killing of Indian Pangolin (*Manis crassicaudata*) in Potohar Region, Pakistan. Pak. J. Zool., 44(5),1457-1461.**(Citation: 01)**(**IF:0.309)**

13. **Tariq Mahmood**, Muhammad Khaled Siddiq, Muhammad Rais and Muhammad Sajid Nadeem. **2012**. Distribution and abundance of freshwater turtles in Korang River Islamabad-Rawalpindi, Pakistan. Pakistan J. Zool. 44 (3): 889-893. **(Citation: 01)(IF:0.309)**
14. **Tariq Mahmood,**Riaz Hussain, Muhammad Rais, Iftikhar Hussain and Muhammad Sajid Nadeem. **2012.** Habitat Analysis and Population Estimates of three falcon species, Red-headed Merlin *(Falco chicquera),* Common Kestrel *(Falco tinnunculus*) and Saker Falcon (*Falco cherrug*), inhabiting district Chakwal, Pakistan. Pakistan J. Zool. 44(3):787-79**. (Citations=03) (IF: 0.309)**

****

4. Curriculum Vitae

Muhammad Rais
Position/Address: Assistane Professor (Wildlife Management), Department of Wildlife Management, PMAS-Arid Agriculture University Rawalpindi, Pakistan. 46000.
Cell: 011-92-332-5442050
Email: sahil@uaar.edu.pk

Academic Qualifications

Ph. D.	Karachi University	2012	---
M. Sc.	Karachi University	2004	1st Position
B. Sc. (Hon.)	Karachi University	2003	1st Division
F. Sc.	Karachi Board	2000	1st Division
Matric	Karachi Board	1998	1st Division

Publications during 2012-2014

1. **Rais, M**., Rehman, J., Baloch, S., Ali, S. M. and Hussain, I. 2014. On the herpetofauna in LoiBher Wildlife Park, Rawalpindi, Pakistan. Taprobanica. 6 (1): 56–58.
2. **Rais, M.,**Abbassi, S., Batool, T., Jilani, M.J., Assadi, M.A., Mubarak, H. and Baloch, S. (2014). A note on recapture of *Nanoranavicina* (Anura: Amphibia) from Murree, Pakistan. Journal of Animal and Plant Sciences Lahore. 24(2): 455-458. **(Impact Factor=0.638).**
3. **M. Rais**, M. Z. Khan, S. A. Ghalib, R. Nawaz, G. Akbar, S. L. Islam and A. Begum. 2013. Global conservation significance of Chotiari Wetlands Complex, Sanghar, Sindh, Pakistan. Journal of Animal and Plant Sciences. 23(6): 1609-1617. **(Impact factor=0.638)**
4. Hussain, I., Abbassi S., Mirza, S.N., Anwar, M., **Rais, M**. and Mahmood, T. 2013. Tree cavities and associated vertebrate fauna in a coniferous forest of Dhirkot, Azad Jammu and Kashmir part of Pakistan. Turkish Journal of Zoology. 37: 647-658. **(Impact factor=0.414)**
5. Bilal, S., **Rais, M**., Anwar, M., Hussain, I., Sharif, M. and Kabeer, B. 2013. Habitat Association of Little Grebe (*Tachybaptusruficollis*) at KallarKahar Lake, Pakistan. Journal of King Saud University-Science (Elsevier). 25:267-270.
6. Khalique, M., **Rais, M**., Mehmood, T., Anwar, M., Ali, S., Bilal, S. and Kabeer, B. 2012. Study on some waterfowls of Mangla Dam, Azad Jammu and Kashmir.Berkut. 21 (1-2): 44-49.

7. **Rais, M**., Baloch, S., Rehman, J., Anwar, M., Hussain, I. and Mehmood, T. 2012. Diversity and conservation of amphibians and reptiles in North Punjab, Pakistan. Herpetological Bulletin. 122: 16-25.
8. Mehmood, T., Hussain, R., **Rais, M**., Hussain, I. and Nadeem, M.S. 2012. Habitat Analysis and Population Estimates of Three Falcon Species, Red-headed Merlin (*Falco chicquera*), Common Kestrel (*Falcotinnunculus*) and Saker Falcon (*Falco cherrug)*, Inhabiting District Chakwal, Pakistan. Pakistan Journal of Zoology. 44 (3): 787-798. **(Impact factor=0.309) (Citations=03)**
9. Mehmood, T., Siddiq, M.K., **Rais, M**. and Nadeem, M.S. 2012. Distribution and Relative Abundance of Freshwater Turtles in Korang River Islamabad- Rawalpindi, Pakistan. Pakistan Journal of Zoology. 44 (3): 889-893. **(Impact factor=0.309)**

5. Curriculum Vitae

Personal Information

Name: **Bushra Allah Rakha**, Lecturer (Wildlife Management)
Address: Department of Wildlife Management, PirMehr Ali Shah, Arid Agriculture University Rawalpindi-46300, Pakistan
Contact No. Mobile: +92-3336341607
Office No: +92-51-9291021
E-mail: arbushra@uaar.edu.pk, bushrauaar@gmail.com

ACADEMIC EDUCATION:			
Institution	**Degree/Certificate**	**Major Subject**	**Division**
PirMehr Ali Shah Arid AgricultureUniversity, RWP	Master of Philosophy	Wildlife Management	1st Division 3.24/4
University of Arid Agriculture, Rawalpindi	Master of Science	Zoology	1stDivision 3.21/4
Allama Iqbal Open University, Islamabad	Bachelor of Education	Zoology, Chemistry	1stDivision
Government Degree College for women, Hasilpur	Bachelor of Science	Zoology, Botany Chemistry	1stDivision
Government Degree College for women, Hasilpur	Higher Secondary school Certificate	Pre-Medical	1stDivision
GovernmentGirlsHigh School No:1, Hasilpur	Secondary School Certificate	Science	1stDivision

Publications during 2012-2014

1. S. Akhter, M. S. Ansari, S. M. H. Andrabi, **Bushra Allah Rakha**, N. Ullah, M. Khalid. 2012. Soya-lecithin in extender improves the freezability and fertility of buffalo *(Bubalusbubalis*) bull spermatozoa. Reprod. Domestic Anim., 47: 815-819.
2. Ansari, M. S., **Bushra Allah Rakha**, S. M.H. Andrabi, N.Ullah, R. Iqbal, W. V. Holt, S. Akhter. 2012. Glutathione-supplemented tris-citric acid extender improves the post-thaw

quality and in vivo fertility of buffalo (*Bubalusbubalis*) bull spermatozoa. Reprod. Bio., 12: 271-276.

3. Akhter, S, M. S. Ansari, **Bushra Allah Rakha**, S. M. H. Andrabi, S. Qadeer, R. Iqbal, N. Ullah. 2013. Efficiency of ciprofloxacin for bacterial control, post thaw quality and in vivo fertility of buffalo spermatozoa. Theriogenology, 80: 378-383.
4. **Bushra Allah Rakha**, I. Hussain, S. Akhter, M. S. Ansari, N. Ullah and S.M.H. Andrabi. 2013. Evaluation of tris-cirtic egg yolk, skim milk and egg yolk citrate extenders for the liquid storage Punjab urial (*Ovisvigneipunjabiensis*) spermatozoa. Reprod. Bio.,13: 238–242.
5. S. Qadeer, A. Batool, K. Mehboob, M. S. Ansari, **Bushra Allah Rakha**, S. M. H. Andrabi, N. Ullah, R. Iqbal, S. Akhter. 2013. Comparison of traditional antibiotic streptomycin with neomycin, polymyxin B or Colistin in extender for buffalo (*Bubalusbubalis*) bull spermatozoa. J. Appli. Anim. Res., 41: 289-293.
6. S. Qadeer, M. A. Khan, M. S. Ansari, **Bushra Allah Rakha**, R. Ejaz, A.U. Husna,M. Ashiq, R. Iqbal, N. Ullahand S. Akhter. 2014. Evaluation of Antifreeze Protein III for Cryopreservation of Nili-Ravi (*Bubalusbubalis*) Buffalo Bull Sperm. Anim. Reprod. Sci., 148: 26-31.
7. R. Ejaz, M. S. Ansari, B.A. Rakha, N. Ullah, A. U. Husna, R. Iqbal and S. Akhter. 2014. Arachidic acid in extender improves post-thaw parameters of cryopreserved Nili-Ravi buffalo bull semen. Reprod. Domes.Anim. 49: 122-125.
8. M. S. Ansari, **Bushra Allah Rakha**, M.F. Malik, S. M. H. andrabi, N. Ullah, R. Iqbal., W. V. holt, and S Akhter. 2014. Effect of cysteine addition to the freezing extender on the progressive motility, viability, plasma membrane and DNA integrity of Nili Ravi buffalo *(Bubalusbubalis*) bull spermatozoa. J. Applied Anim. Res., http://dx.doi.org/10.1080/09712119.2014.987292.
9. Mehmood, A., M. S. Ansari, T. Hussain, S. Akhter, S. A. Khan, S. Hassan, A. A. Khan and **Bushra Allah Rakha**. 2012. Common shrew (*Suncusmurinus*): A potential reservoir of pathogenic bacteria at poultry farms, Rawalpindi, Pakistan. Pak. J. Zool., 44(3): 879-880.
10. Mehmood, A., M. S. Ansari, S. Akhter, A. A. Khan, I. Hussain, Shams-ul-Hassan,T. Z. Qureshi and **Bushra Allah Rakha**. 2012. Ocuurence of Pathogenic bacteria in small mammals-inhabiting poultry farms of Rawalpindi/Islamabad, Pakistan. Pak. J. Zool., 44(4): 1185-1187.
11. N. A. Qureshi, M. S. Ansari, S. Akhter, A. A. Khan, I. Hussain and **Bushra Allah Rakha**. 2012. Feeding Habits of Common Quail (*Coturnixcoturnix*) migrating through Rawalpindi, Pakistan. Pak. J. Zool., 44 (6): 1760-1762.
12. Batool, K. Mehboob, S. Qadeer, M. S. Ansari, **Bushra Allah Rakha**, N. Ullah, S. M. H. Andrabi, S. Akhter. 2012. Effect of α-tocopherol acetate and ascorbic acid in extender on quality of Zebu bull spermatozoa. Pak. J. Zool.,44 (6): 1487-1491.
13. Ali,S, **Bushra Allah Rakha**, I. Hussain, M. S. Nadeem and M. Rafique. 2013. Ecology of Feral Pigeon (*Columba livia*) in Urban Areas of Rawalpindi/Islamabad, Pakistan. Pak. J. Zool., 45: 1229-1234.
14. Ansari, M. S., **Bushra Allah Rakha**, S. M. H. Andrabi, N. Ullah, R. Iqbal, W. V. Holt and S. Akhter. 2014.Thioglycol in extender improves the post-thaw quality of buffalo (*Bubalusbubalis*) bull spermatozoa. J. Anim. Plant Sci. 24: 1256-1259.
15. Zia, U., M. S. Ansari,S. Akhter and **Bushra Allah Rakha**. 2014. Breeding biology of red vented bulbul *(pycnonotuscafer*) in the area of rawalpindi/Islamabad. J. Anim. Plant. Sci. 24**:**24: 656-659.

16. M. S. Ansari, **Bushra Allah Rakha**, R. Iqbal, S. Akhter**.** 2014.Effect of glutathione in extender on the Freezability of Sahiwal bull spermatozoa. Pakistan Journal of Zoology. 46: 17-21.
17. S. Akhter, **Bushra Allah Rakha**, R. Iqbal, M. S. Ansari. 2014. Effect of bovine serum albumin on motility, plasmalemma, viability and chromatin integrity of buffalo bull spermatozoa. Pakistan Journal of Zoology. 46: 115-120.
18. Akhter S, M. S. Ansari, **Bushra Allah Rakha**,S. M. H. Andrabi,M. Qayyum and N. Ullah. 2014.Effect of Fructose in Extender on Fertility of Buffalo Semen. Pakistan Journal of Zoology. 46: 279-281.

****