Department of Fisheries and Aquatic Sciences
School of Natural Resource Management

Annual Field Work/Orientation for Postgraduate and International Students

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BACKGROUND INFORMATION

The Academic Programmes in Fisheries and Aquatic Sciences at the University of Eldoret has continued to bridge knowledge and skills gap by offering an all round undergraduate and postgraduate studies with competencies in handling capture fisheries management, aquaculture, fisheries postharvest management, aquatic sciences (freshwater and marine) and environmental conservation issues related to the aquatic environment. The Department of Fisheries and Aquatic Sciences offers various fisheries curricula developed with full participation of all relevant stakeholders at Diploma, Bachelors, Master and Doctorate levels. The alumni of the department are currently deployed at national, regional and international level, serving in various research institutions, State Department, County governments, Parastatal Organizations, inter-governmental, international and national NGO's dealing with conservation of aquatic resources. A number of these alumni have also established their own businesses in fish farming, fish feed production, and ornamental fisheries among others.

ACADEMIC PROGRAMMES

The department offers both general and specialized academic programmes in Fisheries and Aquatic Sciences which includes:

- Diploma in Aquaculture and Fisheries
- Bachelor of Science in Fisheries and Aquatic Sciences
- Master in Fisheries and Aquatic Sciences (Aquatic Science Option)
- Master in Fisheries and Aquatic Sciences (Aquaculture Option)
- Master in Fisheries and Aquatic Sciences (Fisheries Management Option)
- Ph.D In Fisheries (Aquaculture Option)
- Ph.D in Fisheries (Fisheries Management Option)

TRAINING FACILITIES

The Department has 42 earthen ponds for aquaculture research and training of both students and fish farmers in the region. The Department has a modern multipurpose hatchery which produces fingerlings for stocking the fish ponds and supply fish farmers in East Africa. The

Department also operates two laboratories for practical, research and training. The labs are equipped for analysis of different water quality parameters, including nutrients, identification of specimens, proximate analysis of food samples and feeds, soil and organic matter analyses and general microscopy and gravimetric methods.

FIELD TRAINING

The need for hands-on training remains a necessity for holistic training in fisheries and aquatic resource management. Field trips and field work, including industrial attachment has been a trademark of the Fisheries and Aquatic Sciences Programmes at Diploma and Bachelors level, at the University of Eldoret, but has not been easy to implement at the postgraduate level due to financial limitations. Most of the postgraduate field activities has in the past been implemented through funded projects such as: i) Aquatic Resource Management through University of Newfoundland-University of Eldoret Curriculum Development Project; ii) UoE-Linkshörping University of Sweden on Water Resource Management; iii) Pond Construction and Management by AquaFish Innovation Lab.; iv) Fish Post Harvest Technology through the UNESCO University of Iceland; v) Aquaculture Development through STRECAFISH Project; vi) Development of Bio-Indicators for River Basins through the NRF Research Funding among others.

The postgraduate field course has been bench-marked across both national, regional and international universities with similar programmes in Fisheries and aquatic Sciences. For example: i) Egerton, BOKU and IHE in Netherlands has a tri-semester M.Sc Programme that allows students to undertake intensive field-based studies in Austria, Netherland and

Kenya on a split-basis; ii) University of Eldoret undertakes a one-week field study at undergraduate in Marine Ecology every academic year; iii) University of Nairobi has an M.Sc Hydrobiology that undertakes field studies in Lake Naivasha, Lake Nakuru, Tana River Catchment, Nairobi River and the Coast of Kenya.

DEPARTMENTAL PROJECTS AND FIELD-BASE STUDIES

Development of a National Bio-monitoring Protocol and Assessment of the Ecological Status of Riverine Ecosystems in Kenya

The project aims to develop, test and validate national macro-invertebrate-based rapid bio-assessment protocols for country-wide use in streams, rivers and other aquatic ecosystems, including manual, policy and briefs which will educate the public and build the capacity of stakeholders on aquatic bio-monitoring techniques for sustainable water resources management and protection in the country. The project is coordinated by University of Eldoret, Department of Fisheries and Aquatic Science in collaboration with Egerton University and National Museum of Kenya.

STRECAFISH Project

The StrecaFish Project is a partnership initiative with the University of Makerere, Ethiopian Institute of Agriculture Research and BOKU University in Austria. This is a 3 year project that is funded by the Austrian Development Cooperation through APPEAR programme. The program has sponsored two PhD students to undertake their studies in Austria and has sponsored three Masters Students to undertake their thesis research work.. So far the project has organized a stakeholder's workshop and a training workshop in aquaculture. Participants included Fisheries Extension officers and selected stakeholders and fish farmers drawn from Uasin Gishu, Baringo, Nandi, Elgeyo Marakwet, Kisumu and Sagana. The training aimed at providing the participants with skills on vital aspects of fish farming including; fish culture techniques, fish nutrition, systems design and construction, fish health, and water quality management.

AquaFish Innovation Lab Project

AquaFish Innovation Lab project is a project funded by United States Agency for international Development (USAID) through partnership with Auburn University and Oregon State University (OSU). The project is addressing fish nutrition research, pond dynamics and aquaponic. A PhD and a Masters student have been funded to undertake their researches in both nutrition and aquaponics. The project will also engage farmers within western and north rift in on farm trainings and workshops on several aquaculture innovations.

Collaborative Training in Fisheries and Aquaculture in East, Central and Southern Africa (COTRA)

The Project aims at achieving sustainable fisheries management and aquaculture resources leading to increased fish production and enhanced food and nutritional security, leading to improved livelihood. The project supports short and long-term mobility programs in fisheries and aquaculture training and research in African Higher Education Institutions (HEIs) and assures well-established quality mechanisms to increase the visibility and recognition of fisheries and aquaculture programmes among African HEIs and ensure unified training procedures and high-quality graduates who will subsequently support the sustainability of the mobility and dissemination practices. The EU funded project is coordinated by the Department of Fisheries and Aquatic Science, University of Eldoret (UoE), in collaboration with Rhodes University (South Africa), Makerere University (Uganda), Official University of Bukavu (DRC), Mzuzu University (Malawi) together with University of Natural Resources and Life Sciences (BOKU – Austria) as technical partner.

OBJECTIVES OF THE FIELD COURSE

Overall Objective

The objective of the field course is to expose postgraduate students to research opportunities in Fisheries, Aquatic Sciences and the Blue Economy under different ecological, environmental, social and economic regimes in a typical real life environment.

Specific Objectives

The specific objectives of the field study will be to:

1. Evaluate and analyze the aquaculture activities and potential in Western Kenya based on different technologies, resource base and value chains
2. Carry out spot sampling in various rivers of varying classification, continuum, anthropogenic and ecological diversities.
3. Compare the impact of River Basin development and channel modification on the ecological integrity, social and economic regimes from practical examples.
4. Determine the levels of ecological and fisheries community structures in freshwater lakes of varying morpho-edaphic development.
5. Determine the status of pollution and eutrophication of various water bodies in Western Kenya
6. To evaluate and analyze fish post-harvest activities within the Lake Victoria basin

LEARNING OUTCOMES

The students will be expected at the end of the field course to identify gaps, challenges and opportunities for researchable topics for their theses studies. The learners should be specifically able to:

1. Identify challenges in aquaculture development, technological constrains, skills requirements, socio-economic issues, policy and value chain constraint.
2. Gain knowledge and skill in field sampling, design and research planning for river catchments.
3. Identify the impacts of river basin development and channel modification and be able to design monitoring, evaluation and mitigation measures for Social and Environmental Climate-change Adaptation (SECA)
4. Analyze ecological and fish community diversity as indicators of ecological integrity of lotic and lentic habitats

5. Determine the impact of anthropogenic activities related to pollution and eutrophication of major water bodies.
6. Gain skills and knowldege on post-harvest activities and technologies for fish processing and reduction of post-harvest loses.

PROPOSED SITES AND HABITATS

The field study will include several topical issues divides into the following categories:

Aquaculture Development

The field study will strive to expose the students to the following aquaculture systems and facilities:

i) **Tigoi Fish Farm**: Small-scale enterprise for production of tilapia, catfish, monosex, feed-mill, aquaponic and training facility. The students will be able to get insight into the level of performance of the farm, the skills and technologies being used in the facility.

ii) **Kisumu County Fish Farm (Nyalenda)**: A modern fish farming facility for a community group running on solar technology.

iii) **Sangoro Riverine Laboratory (KMFRI)**: Aquaculture Centre for National Research Agency with research facilities for and output intended for uptake by farmers and extension workers.

iv) **Jewlet Fish Farm:** Commercial Farm operated by an alumnus of UoE for production of monosex tilapia, catfish and feed-mill.

River Systems

i) **Nyando River:** Drains from the Mau Catchment with large farms for tea, sugarcane growing, two large sugar factories and rice farming in the floodplain.

ii) **Sondu-Miriu:** Draining a rich tea growing catchment with rich volcanic soil. Sondu-Hydroelectric Power Station, Odino Falls and a Sub-Hydropower Station on the tailrace.

iii) **Awach-Tende:** Draining from Kisii highlands and passing through both Upper Midland and Lower Marginal Agro-Ecological Zones.

iv) **Oluch-Kimira**: Confluence of two rivers draining from two different basins with completely differing geological and agro-ecological characteristics. The difference is reflected in the water quality and probably biodiversity.

Pollution

i) **Chemelil/Muhoroni Sugar Factory:** The impact of both point and non-point pollutants

ii) **River Kasat:** Kisumu Water & Sewerage Company treatment plant

iii) **Homa-Bay:** Sewage treatment plant technology, siting, management and mitigation measures.

iv) **Kisian River:** Impact of industrialization in the lower reaches (Mattress and Matchbox factories) – **Currently closed**

Lacustrine Ecosystems

i) **Lake Victoria:** Ecology, limnology, species diversity, fish species community structure, commercial fishery, invasive species, eutrophication.

ii) **Lake Sare:** Impact of wetlands and water quality/species assemblage

iii) **Lake Kanyaboli:** Species diversity and living museum for endemic cichlids. Impact of River Yala inflow, massive wetland vegetation, IBA and wildlife diversity.

iv) **Lake Simbi:** Saline lake with unique limnological characteristsics, unique blue green algal community and occasional homage for flamingoes.

EQUIPMENT AND SAMPLING

Water Quality

Use of the following equipment for physical water quality parameters:

i) **YSI 550 Digital Meter:** DO, Temperature, Conductivity and pH

ii) **Hydrolab:** OR Potential, barometric pressure, phosphate-nitrate concentration, pH, Conductivity, salinity etc.

Plankton

Plankton net for zooplankton and phytoplankton in rivers and lakes.

Macro-invertebrates

i) Kick sampling and dip nets for different macro-invertebrates in water at the littoral zones.

ii) Ekman Grab for benthos

Fish sample

Use and analysis of fishermen catches and catch data from BMUs and KMFRI.

Can we sample fish in the rivers- use of Electrofisher or beach seining