

Annex III – Proposals from Mulungushi University



MULUNGUSHI UNIVERSITY

Pursuing the frontiers of knowledge

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

Proposed Areas for Partnership with Austrian Institutions

1. PARTNERSHIP IN BUILDING CAPACITY IN BEEKEEPING AND HONEY PRODUCTION

Background

Use of traditional beekeeping methods is still dominant in Zambia. Under these methods, there is inadequate controls and prevention of pests and diseases. Emphasis is placed on harvesting honey and wax and not other products such as royal jelly and propolis. In recent years, it has been observed that there is an increase in absconding of bee colonies.

Given the above, **the capacity building in beekeeping and honey production value chain** project was initiated, aimed at expanding the beekeeping industry through the establishment of a Beekeeping Centre at Mulungushi University (MU) through the School of Agriculture and Natural Resources (SANR). The Centre spearheads research in quality control, bee breeding and genetics, stock improvement, pest control, honey bee health – all aimed at increasing productivity in beekeeping. The rationale is to provide an alternative livelihood to forest dependent communities in order to reduce forest degradation caused by charcoal production, firewood collection and agricultural activities. This project was supported by the **Southern African Science Service Centre on Climate Change Adaptive Land-use (SASSCAL)** Programme in cooperation with the German Federal Ministry of Education and Research (BMBF) to help mitigate the effects of climate change on land management and water resources in Southern Africa.

What SANR has done and the current status

The following has been done so far:

- i) Beekeeping needs assessment survey, covering four (4) provinces – identifying gaps, challenges and opportunities in the beekeeping industry
- ii) Assessing the effect of hive position on bee occupation
- iii) Testing of various baiting materials
- iv) Identification of pests and diseases affecting beekeeping in two agro-ecological zones;
- v) Studies on bee occupation rate and honey production
- vi) Evaluating options for sustainability in beekeeping (included product/ services development and branding)
- vii) Bee colony surveillance programme (monitoring of bee colony populations and distribution)
- viii) Capacity development (laboratory equipment and personnel)

What needs to be done under collaboration?

The following key areas are proposed for collaboration:

- i) Establishment of plantations for specific honey flavours
- ii) Formulation and implementation of strategies on management and conservation of indigenous forests for beekeeping and climate change mitigation
- iii) Conducting regional studies on bee colony distribution
- iv) Carrying out bee pollination studies and services for enhanced crop production /food security
- v) Identification of pests and diseases affecting beekeeping in agro-ecological zones II and III
- vi) Bee colony surveillance programme (monitoring of bee colony populations and distribution)
- vii) Research and building capacity in bee products and equipment development, i.e.
 - Research in molecular biology/ Bee genetics
 - Research in bee products development – Installation of wax extractors, wax shaping equipment, bee venom collectors, pollen traps, royal Jelly extractors
 - Design, testing and installation of various hive types

2. PARTNERSHIP IN COMPUTATIONAL MODELLING

Background

The School of Agriculture and Natural Resources (SANR) at Mulungushi University (MU) is pursuing the frontiers of knowledge at the complex nexus of interactions between human and natural systems. The coupled human and natural systems such as agro-ecological systems are increasingly undergoing rapid transformations under such forcing mechanisms as climate variability and change as well as urbanization. Yet the transformations induced are not widely investigated in Zambia and are thus poorly understood from the sustainability perspective. This creates a knowledge gap for policy decision-making and pragmatic action on managing the syndromes of unsustainability such as water scarcity and low agricultural productivity of agro-ecological systems. The gap is partly attributed to limited computational modeling skills on the part of scientists and engineers in the country. Therefore, there is a need for capacity building of local scientists and engineers to utilize computational modelling techniques to navigate these complexities.

What SANR has done and the current status

To this end, SANR has been involved in computational modelling projects such as the Crop Simulation Project with the Food and Agriculture Organization (FAO), which involved downscaling weather parameters (temperature and rainfall) from global climate models to regional and country scales; then using downscaled climate data to simulate crop yields at local levels. The intended project outcomes could not be delivered on time on account of limited capacity for computational modeling.

What needs to be done under collaboration?

In order to address the above limitation at institutional level, MU has in its strategic plan of 2019-2023, set goals on expanding and consolidating the use of Information Communications Technologies (ICTs) in the core business functions of the University including research. To this effect, SANR wishes to intensify its computational modelling skills, particularly climate modeling, hydrological modeling, agro-ecological system modeling, etc. in order to undertake cutting-edge research. Such skills will help to successfully implement currently running projects including co-evolutionary hydrologic modeling of agro-ecological systems for climate change adaptation in Zambia. It is envisaged as such that partnership with Austrian

universities in this undertaking will benefit the institution and country to manage the complex reality of things.

3. PARTNERSHIP IN AQUACULTURE

Background

Current records on fish protein intake in Zambia show a decline in the per capita fish consumption from the 12 kilograms recommended per capita to about 6 kilograms. This decline is attributed to the rapid increase in the national population, now estimated at 16 million coupled with the declining capture fisheries. In order to achieve a 12 kg per capita fish consumption rate, the country requires an annual production figure of more than 185,687MT. This is against the local production of 106,472MT. There is, therefore, a deficit of 79,215MT if the country has to achieve 12kg per capita fish consumption per annum.

What SANR has done and the current status

In order to bridge the deficit, Mulungushi University (MU), through the School of Agriculture and Natural Resources (SANR), has been collaborating with the Department of Fisheries (DoF) through a Memorandum of Understanding to establish a Centre of Excellence in aquaculture which would promote and develop fish farming as a way of increasing the supply of fish. Land for the development of aquaculture facilities has been secured. Two Staff Development Fellows are pursuing postgraduate studies in fish genetics and fish nutrition.

Specific activities of the project (Centre of Excellence in aquaculture) are to:

- i) Introduce undergraduate and postgraduate programmes in Fisheries and Aquaculture.
- ii) Produce fingerlings for sale to local farmers
- iii) Where found to be ecologically feasible provide fingerlings for restocking depleted water bodies.
- iv) Research and develop new and affordable fish feeds in order to popularize fish farming at community and national levels.
- v) Train fish farmers in new technologies and skills to improve fish production and create jobs, at community and national levels.
- vi) Provide a facility for teaching, research and community outreach as a way of enhancing the country's profile at regional and international levels
- vii) Set a firm national research capacity as a foundation for commercialization of fish production and long-term sustainability.
- viii) Produce qualified and practically capable personnel to carry out research and monitoring of the fisheries sub-sector.

What needs to be done under collaboration?

- i) Develop undergraduate and postgraduate curricula in Fisheries and Aquaculture
- ii) Prepare joint proposals for funding to realize the aspirations of building the Centre of Excellence in Aquaculture at Mulungushi University
- iii) Conduct research on fish genetics and breeding, nutrition, fish disease management, and fish preservation technologies with the Department of Fisheries using the current existing facilities under the Department.