



# NEWSLETTER



Capacity Building to deliver competent human resources in integrated water resource management and aquaculture for equitable and sustainable livelihoods in Kenya's arid and semi-arid lands and beyond (NICHE/KEN/158).

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## Preface

By **Carel Jaspers**, director Q-Point



The project "Capacity Building to deliver competent human resources in integrated water resource management and aquaculture for equitable and sustainable livelihoods in Kenya's arid and semi-arid lands and beyond (NICHE/KEN/158)", is now in the final phase of implementation. With the latest extension training, a pilot on tracer studies and revision of the MSC programs, the project will end in November 2017.

I hope you enjoy reading.

Carel Jaspers, director Q-Point

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## Centre of Excellence in aquaculture and water resources management in arid and semi-arid lands of Kenya takes shape

By **Dr. Johnson U. Kitheka**, Director of the NICHE Project, the Dean of the School of Water Resources Science and Technology at the South Eastern Kenya University



The practice of aquaculture and water resources management in arid and semi-arid lands of Kenya is bound to obtain a major boost following the establishment of the Centre of Excellence at the South Eastern Kenya University in Kenya. The Centre of excellence which is being established with funding from the NUFFIC NICHE Project will be based at the School of Water Resources Science and Technology.



*An experimental re-circulatory aquaculture system at the School.*

The Centre of Excellence will be committed to knowledge sharing and technology transfer through training, research, extension and consultancy focusing on scientific, economic and social dimensions of integrated water resources management and aquaculture in arid and semi-arid lands of Kenya.

It is expected that once the Centre of Excellence becomes fully operational, it would;

- Offer both market tailored short- and long-term training programs in integrated water resources management and aquaculture, emphasizing on the combination of education and business application.
- Conduct collaborative research focused on water resources management and aquaculture.
- Provide demonstration and extension services with special emphasis on fish farming and sustainable water resources management in arid and semi-arid lands of Kenya.
- Share knowledge (e.g. market information/research, innovations, best practices) and create forums for successful collaboration in research and development.
- Undertake consultancy with a view to contributing to the development and professionalization of the aquaculture and water Industry in Kenya.

Once the Centre of Excellency becomes operational, fish farming and water resources development in the arid and semi-arid lands that covers 80% of Kenya will be enhanced. This will contribute towards poverty reduction and achievement of the goals of Kenya's Vision 2030.

In the past four years, the School of Water Resources Science and Technology, with the financial support of the NUFFIC NICHE Project, has been involved in the

implementation of project activities that were aimed at building the capacity of the Centre of Excellence. Already, the School has acquired latest equipment for aquaculture, hydrology and water resources management to boost field and laboratory based facilities for training of undergraduate and postgraduate students including other stakeholders. The School has also acquired an automatic weather station and constructed fish ponds and a re-circulatory aquaculture system that will be used for training and research.



*Computer laboratory at the School of Water Resources Science and Technology.*

The academic staff within the School have also been trained on pedagogy, blended learning, strategic management, extension and outreach, aquaculture value chain analysis, hydrological and aquaculture measurements and practical's, among others. In addition to the undergraduate and postgraduate degree programmes, the School has also developed short-term training courses in aquaculture and water resources management.

These short-term training courses are focused on:

- (i) water harvesting, water re-use, soil and water management;
- (ii) fish pond construction (including incubators, tanks, bio-filters);
- (iii) fish pond management;
- (iv) fish breeding;
- (v) fish feed processing, formulation and packaging;
- (vi) development of entrepreneurial skills;
- (vii) value addition and marketing;
- (viii) HACCP & standards;
- (ix) irrigation water reuse;
- (x) environmental impact assessments focused on development projects;
- (xi) groundwater exploration and development;
- (xii) survey of water resources for development.

The Centre of excellence will also offer consultancy services focusing on fish pond site selection, fish pond construction and management, fish health, environmental impact assessments, fish feed formulation and nutrition, fish breeding/propagation, development of entrepreneurial skills, fish value addition and marketing, among others.

The Centre will also offer consultancy services in water resources development focusing water harvesting, storage and reuse, hydrological surveys for selection of sites for water development, policy formulation, among others. The School has already identified key stakeholders who will be approached for cementing of partnership in the delivery of services of the Centre. The stakeholder's workshop is planned to be held in Kitui before August 2017.

## Training Agricultural Extension

By Lambertus Vogelzang, independent trainer



The Niche SEKU project aims at supporting the School of Water Resources, Science and Technology (SWRST) to become a respected Centre of Excellence in water management issues. A number of project activities have already taken place since the beginning of the project in 2012. Meantime the need was felt to organize also a Training Agricultural Extension to strengthen the communication and cooperation with relevant stakeholders, especially farmers.

discussions, assignments, videos, energizers, etc. All with the aim to share and feel the relevance of being connected with farmers during extension activities and also being able to master useful communication skills, like providing motivating presentations, leading inspiring group discussions, asking questions, checking understanding, probing, applying feedback, and being aware of non-verbal communication.

### Training Agricultural Extension

This Training Agricultural Extension took place from 18th until 20th of April 2017 at the SEKU compound. The aim was to get the participants further familiar and also skilled in applying useful extension methods. Therefore the training was a motivating combination of a variety of training methods, like interactive group



*Training Agricultural Extension - Callen introducing herself.*

## **Training results and follow up**

At the end of the training the participants shared that they enjoyed the liveliness and practical character of the training. And they are eager now to apply what they learnt during the training. Therefore, they shared that they would appreciate when further support could be given in practicing the newly gained insights and skills during group discussions, presentations and individual consultations with farmers in the field. Also they would like to get support to set up a business plan for organizing agricultural extension at SEKU as well as further organizing and implementing the Bachelor Education and Extension.



*Overview of group work exercising with getting information.*

## **Appreciation and success**

Finally I want to express thanks for the nice cooperation and socialization I had with the Kenyan colleagues during this mission. And sure I wish them success in implementing the presented creative action plans for the SEKU/SWRST organisation and also for themselves individually to bring agricultural extension to the next higher level, as it was also mentioned in one of the evaluation forms.



*Sonia sharing answers to afternoon exercise.*



*Words of appreciation by Johnson.*



## Viability of sand dams for water storage in arid and semi-arid lands in Tiva Catchment in Kitui County

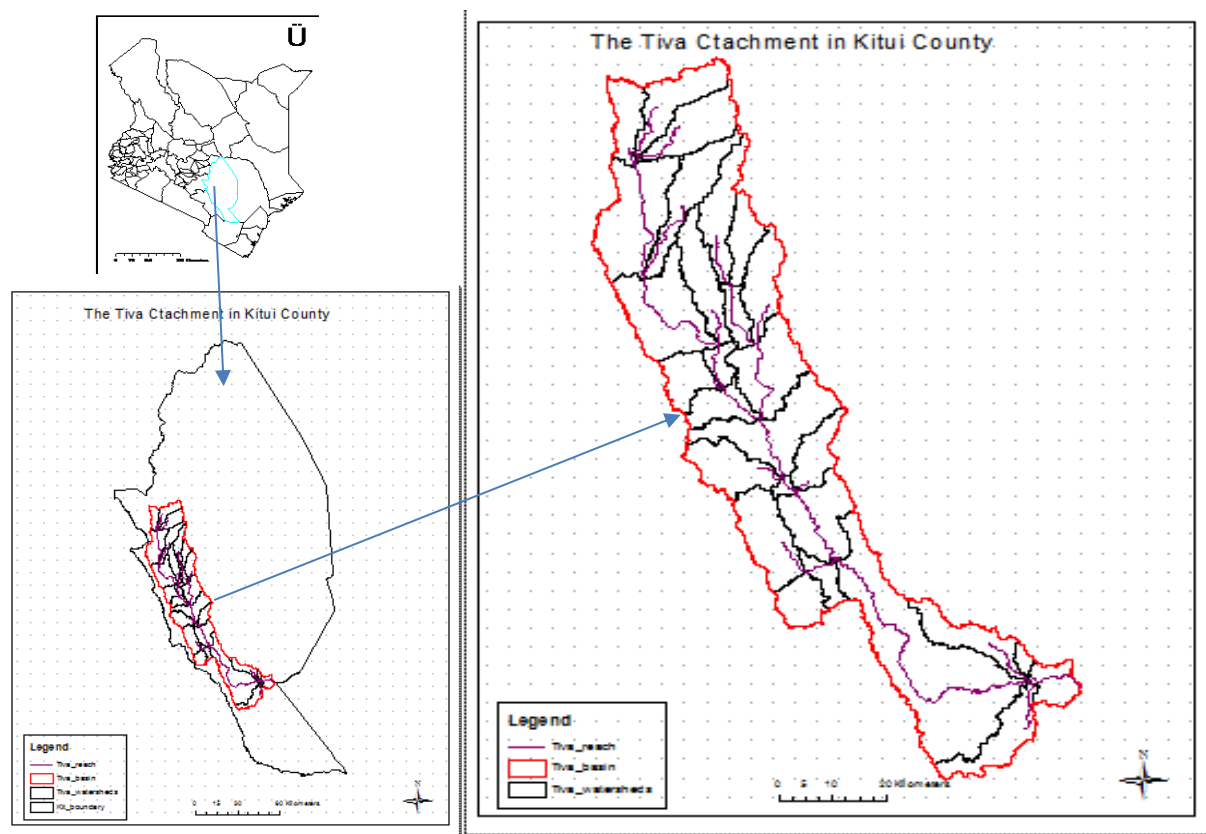
By Keziah Ngugi, PhD student



The PhD is being undertaken at the University of Nairobi, Department of Land Resource Management and Agricultural Technology

(LARMAT). This started from October 2014 with course work for two semesters on Dryland Resources Management which was followed by research proposal development. This culminated in successful proposal

defense in July 2016. Since then Keziah has undertaken field work to determine the current status of sand dams in Tiva river basin (map) and processing of the results is underway. A second round of field work will be undertaken at a later date this year (2017) and hopes to complete the PhD in 2018. Keziah would like to thank the SEKU NICHE project for the financial support towards the study.



Map of Tiva Catchment in Kitui County.

### Overview of the research

Innovative methods of capturing and storing water geared towards increasing access to water and making the asals more productive have been practiced for decades. Asals are important in Kenya as they cover about 84% of the total land

area, support over 80% of the livestock population and about 50% of human population. Access to water in Kenyan asals areas such as Kitui is a big challenge as there are few surface and ground water sources.

Existing rivers are seasonal, sand choked channels that only carry water during the rainy season. These seasonal rivers are however an important and traditional water source as often it is in these channels that holes are dug with the hope of finding water. These holes grow in depth to dangerous levels and there are reports where they collapsed on people, livestock and wildlife, killing them. The first sand dams were built to improve on the water storage in these sandy rivers.



*The water holes get deeper and deeper in search of water.*

Sand dams are impermeable barriers built across seasonal sandy rivers that impound sand that contain water in its pore spaces. In Tiva catchment, the impermeable barrier is a masonry wall recommended to be raised in stages to ensure it retains coarse sand only, while letting silt and clay particles to flow on with the storm water. Sand dams are constructed on the premise they will supply water indefinitely with minimal maintenance, but recent observations and studies have proved otherwise. Several sand dams have failed to supply water as expected. Their capacity to supply water sustainably has

come under threat from natural and human induced factors.



*Sometimes the storm causes havoc, a broken wall and uprooted tree. A case of poor location.*



*Part of the sand dam carried away by the storm.*

Like other hydrological systems, parameters and variables within the sand rivers' watersheds are interdependent and operate within the sand dams hydrologic systems. Most previous research conducted on sand dams considered them as discrete units without considering the interdependence of the various parameters at play. Sand dams are expensive to construct and their investment need to be justified. This research assesses these natural and human induced factors that affect sand dams' water discharge and will develop recommendations for their sustainable use as water resources. The motivation of this study is based on a desire to increase access to water where resources for this purpose have been dedicated.

It is disheartening to see sand dams that do not supply water yet massive resources have been utilized building sand dams. On the other hand there are successful sand dams from which we can learn from hence the need for this study.



*One of my favorite. Beneath this sand there is a lot of water. A sand dam to learn from.*

The proposed overall objective of the study is to assess viability of sand dams as a sustainable water resource with the aim of coming up with recommendations that will improve access to water from sand dams in the asals. The study will be achieved through assessing current status of sand dams in Tiva watershed of Kitui County. Suitable regions where sand dams can be built will be identified using the GIS overlay technology. The volume of sediments generated by each sub catchment will be used as a guide to raising the dam walls as well as best locations for siting sand dams. The SWAT model will be used to develop scenarios in the past, present and expected future to inform on whether sand dams will still be viable under the expected human induced factors and changing rainfall patterns. Sand dams have been observed to supply more water than the expected volume of water they can hold.



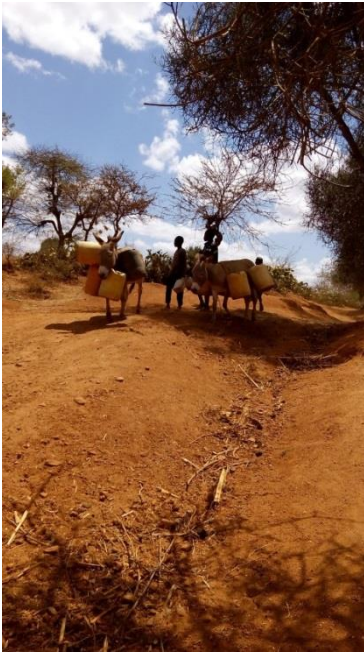
*Livestock on the downstream of a sand dam.*

This research will seek to identify sources of water that end up in the sand dam. Expected results will include the percentage of sand dams that are in good working condition as well as the underlying catchment factors that interfere with their performance. The results will show how these factors affect the quantity and quality of sedimentation within the sand dams. The results will include how past development of sand dams complied with the set guidelines.

**The results will be useful for guiding construction of sand dams in suitable sites to avoid wastage of resources.**

Another output will be maps of land suitability classes showing regions that are suitable or unsuitable for sand dams' construction. The results will also include a revised set of guidelines to be used when siting sand dams. Suitable models for sand dams' performance and sustainability will be proposed with the aim of developing sand dams' management strategies for adoption by communities and County governments where sand dams exist. Sources of water that end up in the sand dams will be another output. The results will be useful for guiding construction of sand dams in suitable sites to avoid wastage of resources.





*When search for water takes up all the time, other activities such as agricultural activities, education, income generation activities suffer.*



*Sometimes a water hole with greenish water is all there is!*



*Livestock and human accessing water from the same water hole. A health hazard.*



*Wastage of resources.*

## Workshop on the development of short-courses for the Centre of Excellence

**By Karin van de Braak, Aquaculture Health Specialist Sustainable Aquaculture Solutions (SAS)**



### **Aim of the Mission**

Formulation of 8 short-term training courses as part of the Centre of Excellence in IWRM and Aquaculture.

### **Mission Dates**

Monday March 20 – Thursday March 23, 2017

### **Consultants**

- Maurits Ertsen (Delft University),
- Nancy Nevejan (Ghent University)
- Karin van de Braak (Q-Point/SAS)



## Context of Mission

In the framework of this Niche Programme a workshop was organized. This was the final mission for the above mentioned consultants in this project.

There was a strong focus on the development of a number of short training courses as part of the Centre of Excellence (CoE) in IWRM and Aquaculture at SEKU University. These short courses are part of the Business Plan and will generate income for the CoE. The short training courses are developed by the responsible people of the School of Water at SEKU and a number of external stakeholders.

## Background

This workshop is a follow-up of the mission in 2016 which concentrated on development of practical training courses as part of the newly developed MSc program for students. These were defined and described by the university staff while some practical work was demonstrated by the consultants and during a farm visit.

The practical trainings with their protocols and the equipment and facilities necessary to carry them out, constitute a solid base upon which the Centre of Excellence in IWRM & Aquaculture can start its activities. Another aim of the workshop was to prepare the final draft of the Business Plan for the Centre of Excellence, linking as much as possible the activities of the curriculum with the ones of the CoE.

## Results of the mission

### Day 1 – Monday, March 20

The mission started with a visit to the facilities at the SEKU campus, developed and built under the NICHE project. These included the rooftop rainwater harvesting system, 4 fish ponds with tilapia and catfish, and 6 wooden raised ponds that were under construction. In addition, an indoor RAS system with 16 aquaria was built, according to the design of SEKU.

The laboratory facilities were still under construction. The computer room with internet connection has been used by the students for one year.



*Rainwater harvesting system and collection tanks that lead to the fish ponds at SEKU campus.*



*The fish ponds and the raised pond system.*



*The fish ponds at the front; the raised pond system behind them and the rooftop for the water harvesting system at the back.*

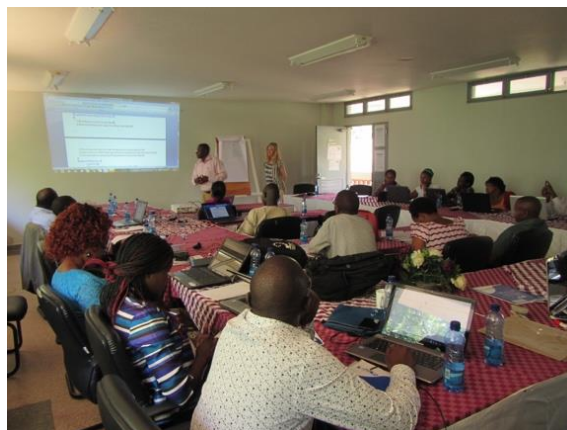
In the evening, a meeting with the key decision makers of the School of Water was held and the workshop program was discussed and finalized.

## **Day 2 – Tuesday, March 21**

The 2-day workshop started with 18 participants, including SEKU University Lecturers and outside stakeholders such as researchers of other aquaculture institutions and County fisheries officers.

After an introduction on the aims of the Workshop and an update on the current status of the development of the MSc curriculum for Aquaculture, the participants introduced themselves and indicated their possible contribution for the coming days. As an introduction, a test-case was worked out in small groups of 3 people in order to familiarize the participants with the terminology and to demonstrate the importance of proper definitions to avoid wrong expectations with the clients.

The list of short courses as foreseen in the Business Plan was the starting point to define which short courses SEKU should offer. After a discussion, a selection of 8 (4 on Aquaculture, 4 on IWM) was made by all participants. The participants were divided in 4 small working groups (according to their expertise) to elaborate 4 proposals. A format was prepared by SEKU and the following information needed to be filled in: the rationale, goals and objectives, target group, expected learning outcomes, mode of delivery, course delivery and structure and specific course contents. Attention was paid to the right formulation of the learning outcomes and matching the planned activities in order to achieve them.



*Presentations and discussion of the short-course programs.*

## **Day 3 – Wednesday, March 22**

The morning started with presentations and discussions of the developed courses. This was followed by the set-up of 4 more short-courses. Finally, some general aspects of organizing short-courses were discussed, including providing details of the responsible people for the specific courses at SEKU and of the collaborating partners/institutes; providing time windows when the training can start; specifying the required knowledge/experience of the participants; providing specifics on the planned field visits and excursions; defining per activity the hours spent for theory and practical work; linking the short training with existing practical courses of the curriculum etc. It was emphasized that there should be a focus on the practical work. In this way, the CoE at SEKU can make a difference.



*Discussion in working groups.*





*Discussion on the short-courses in 4 working groups.*



The following short-courses are developed:

- Aquaculture:
  - Integrated Aquaculture Systems;
  - Fish Breeding and Propagation;
  - Fish feed processing and formulation;
  - Value addition and Marketing.
- Water:
  - Rainwater Harvesting;
  - Small-scale irrigation systems;
  - Design and construction of sand dams;
  - Water quality using traditional water purification methods.



*Continue group work in the morning and presentation, discussion and finalisation of the short courses in the afternoon.*

## **Day 4 –Thursday, March 23**

The last day of this mission was filled with a field visit to the integrated farm of Eric Mumo in Nzambani, Kitui county. On the next page you can see a photo impression of this day.



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*Field visit to the integrated farm of Eric Mumo in Nzambani, with lunch prepared with farm-grown ingredients.*



## Project results 2016

**By Carel Jaspers, director Q-Point**

- Improvement in organisational structures, policies and systems within the university: Strategic management, integration of M&E in QMS.
- Capacity built among staff for value chain analysis, hydrological and aquaculture research/measurements.



*Capacity built among staff.*

- The School has new academic programmes-MSc in aquaculture and PhD in IWRM.
- The School now has updated three academic programmes –BSc (Hydrology and WRM), BSc-Fisheries Management and Aquaculture Technology and BSc-Aquatic Sciences.
- Improvement in teaching following training of academic staff on effective teaching methods. Favorable students evaluations at the end of the semester.
- The School is now able to offer more practical training following procurement of hydrological and aquaculture equipment. School laboratories to be fully functional by end of April 2017. Computer laboratory completed in 2016.
- Construction of fish ponds for research and rainwater harvesting systems in the university.

- Business Plan for the Centre of Excellence in IWRM and aquaculture in ASALS completed.



*Automatic weather station.*

### **Gender: Main achievements and results:**

- Management have been staff sensitised and trained on gender mainstreaming. There is change of attitude on the capability of women in the university.
- Gender mainstreaming policy developed and approved by the University Management Board.

- University is determined to ensure gender balance as per the Constitutional requirements.
- 71% (10/14) of all staff in the SWRST are women. 63% (7/11) of all academic staff in School are women.
- Increased appointment of women in key management positions in the university.
- Increased enrolment of girls in various academic programmes.
- Improvement in the performance of girls in various Schools of the university.
- Awareness created on gender issues has led to change in behavior and attitude among students and staff.
- Reduction in gender based violence within the university.

## **Labour market: Results and achievements:**

- Labour needs assessment undertaken at the beginning of the project identified the needs of the stakeholders.
- Capacity built for the analysis of value-chain in aquaculture through various training workshops.
- SEKU staff has increased understanding of the key players in fisheries/aquaculture value chain.
- Linkages with the key stakeholders in the water and aquaculture/fisheries sectors established (to be formalised in an agreement for mutual engagement).
- Stakeholders engaged in the development of new academic programmes (e.g Kenya Marine and Fisheries Research Institute Aquaculture Research Centre-Sagana, Jambo Fish Farm, Farm Africa, CBOs, NGOs, County Government of Kitui, etc).
- Stakeholders engaged in the formulation of the Business Plan for

the Centre of Excellence in Aquaculture and Integrated Water Resources Management.

- Stakeholders to be engaged in the implementation of the short-term training programmes in aquaculture and integrated water resources management.
- In general, the School is more aware of the needs of the labour market.

## **Challenges:**

- Lengthy procurement procedures: This has led to delays in the procurement of supplies and services required by the project.
- Lengthy financial management procedures: This has led to delays in the payment for services rendered and supplies delivered to the project.
- Heavy workload: Most of the academic staff engaged in the implementation of the project are also engaged in teaching, research and administrative duties within the university.
- Staff turnover: Some of the staff that were engaged in the project left for greener pastures.



*South Eastern Kenya University.*



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## Partners



**Q-Point**  
The Netherlands



**Delft University of Technology**  
The Netherlands



**Ghent University**  
Belgium



**SAS Consultancy**  
The Netherlands



**Egerton University**  
Kenya

## Requesting organisation



**South Eastern Kenya University**

## Donor



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## Colophon

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