

CLEAT/Hali ya Hewa Annual Meeting Report



March 2016

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Participants

Present:

Peter Staehr	pst@bios.au.dk	Aarhus University, Denmark	Project manager, lake productivity, WP1
Ishmael Kimirei	kiakimirei@yahoo.com	Centre Director, TAFIRI-Kigoma,	Limnology, WP1 lead
Catherine O'Reilly	cmoreil@ilstu.edu	Illinois State University, USA	Limnology, WP1
Charles Lugomela	lugomela@uccmail.co.tz	University of Dar es Salaam	Limnology, capacity building, WP5 lead
Johnny Larsen	jhl@enavigo-consult.com	Enavigo Consult	Fisheries, WP4
Robert Kayanda (present week before meeting)	bobkayanda@yahoo.com	Centre Director, TAFIRI-Mwanza	Fisheries, WP4 lead
Mangus Ngoile	makngoile818@gmail.com	University of Dar es Salaam	Fisheries management, WP3
Paul Onyango	onyango_paul@yahoo.com	University of Dar es Salaam	Socio-economics, WP4
Joan Brehm	jmbrehm@ilstu.edu	Illinois State University	Sociology and the environment
Prisca Mziray	priscamziray@gmail.com	TAFIRI-Kigoma/UDSM	Ph.D. student in biogeochemistry, WP 1 and 2
Huruma Mgana	hmgana@gmail.com	TAFIRI-Kigoma/UDSM	Ph.D. student in fish biology, WP3
Gideon Bulengela	gbulengela@yahoo.com	UDSM	Ph.D. student in socio-economics, WP4
Athanasio Mbonde	chimbonde@yahoo.com	TAFIRI-Kigoma	Potential Ph.D. student in biology
Ben Lowe	ben.s.lowe@gmail.com	U.S.A. – institution TBD	Potential grad student in fisheries/human dimensions

Not Present:

Dennis Trolle	trolle@bios.au.dk	Aarhus University	Ecosystem modeling, WP2 lead
Torben Lauridsen	tll@bios.au.dk	Aarhus University	Fisheries biology, WP3 lead
Hans Andersen	hea@bios.au.dk	Aarhus University	Capacity development, hydrology, WP 5

Agenda and activities

Prior to official meeting days

- Training activities in the laboratory, working time with students

Official meeting days

Monday 14

- Team building exercise
- Work package report backs and graduate student mini-presentations.
- Plan workshop with fishermen.

Tuesday 15

- Discussion of the code of conduct/co-authorship policy.
- Working day for WG future planning and writing.

Wednesday 16

- WG report back on their intended activities for the next year, with timelines and budgets.
- Afternoon – follow-up and networking meetings.

Thursday 17

- Workshop with fishermen.
- Ongoing field work/data analysis.

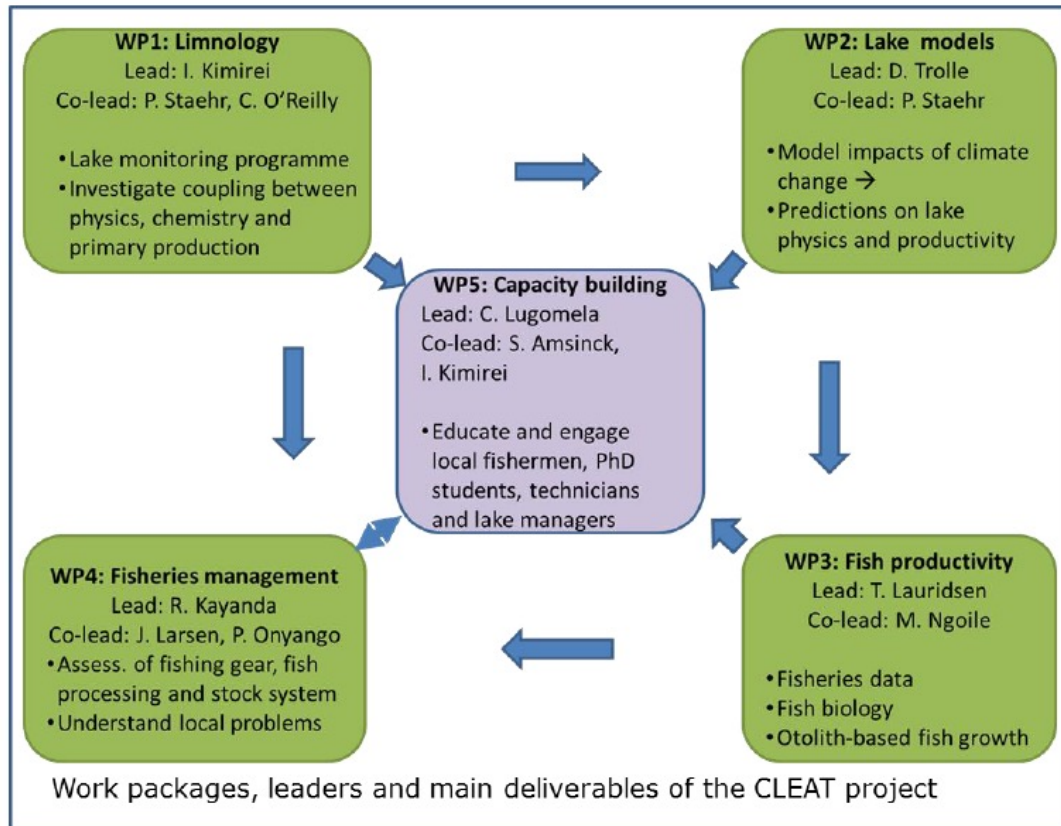
Welcome

Led by: Ishmael and Peter

Welcome from Ishmael Kimirei, Center Director, TAFIRI-Kigoma

Introductions and overview from Peter Staehr

1. Acknowledgement that this project is made possible by DANIDA and the Danish taxpayers
2. Reminder that the primary purpose of this project is to help support the livelihoods of Lake Tanganyika fisherfolk
3. Project goals review:
 - a. Build regional capacity in lake quality monitoring and sustainable management of fisheries
 - b. Improve our understanding of climate-driven changes in lake functioning and fisheries productivity in Lake Tanganyika
 - c. Gather essential data to:
 - i. Develop lake ecosystem models and
 - ii. Inform local citizens, especially small-scale fishermen, of lake conditions to promote sustainable fisheries
4. Goal is for project and the various work packages to be intentionally integrated. We are a team. We have our respective WP responsibilities but need to be working together efficiently and in unity.



Team-building

Led by: Catherine

Personal sharing from everyone's past year

1. Discussion on what has worked well/not well in our team(s)
2. Google's take on what makes teams successful:
 - a. Talking time – every team member talks roughly equal amount of time overall
 - b. High social sensitivity – team members pick up on verbal/nonverbal cues

WP Presentations: Activities during the last year

WP1: Limnology

WP Leader: Ishmael Kimirei

Graduate Student: Prisca Mziray

1. Have met all planned activities and Prisca's project is approved
2. SOPs are almost done – need WP review and approval
3. Monitoring is progressing well but the fuel budget is a challenge (almost doubled)
4. Buoys are not here yet – have money for transportation from LIC and waiting for the Bill of Landing in order to process exception. Expecting equipment by end of April

5. Monthly monitoring ongoing between Kigoma bay and Mahale (with 9 intermediate sites in between), followed up by lab analysis
6. Prisca reported on data and findings so far, as well as future plans for training, data collection, and presentations
7. Collecting data from deeper than 100m in order to look at changes below the oxycline as well
8. Should also measure silica (since it relates to diatoms)

WP2: Modeling

WP leader: Dennis Trolle (absent) and Peter Staehr (with help from Karsten Bolding)

Graduate student: Prisca Mziray, Huruma Mgana

1. Incorporating satellite data, historical data, and buoy data
2. Lake bathymetry has been acquired to set up model
3. On track to set up and test a 3D model that will synthesize limnological understanding with fisheries and eventually be used as a management tool
4. Prisca and Huruma will travel to Denmark in August 2016 for training with Dennis and Karsten – they will need the right computers for this
5. Ishmael had an idea/contact about data that can support developing this model

WP3: Fisheries Production

WP leader: Mangus Ngoile (Torben Laurdisen absent)

Graduate student: Huruma Mgana

1. Protocols from previous EU projects delivered, used as input and suggestions from standardized limnic sampling
2. Literature review on fish biology and fishery data in Lake Tanganyika has been conducted and uploaded to CLEAT dropbox
3. Huruma's proposal approved; feedback to focus on the pelagic fishery and include hydro acoustic; reduce emphasis on littoral fishery
4. Collecting data on fish yield and water temperature, focusing on three landing sites (Kigoma municipal, Mwamgongo, and Buhingu)
5. Established contact with the Ministry of Fisheries but catch data are sporadic and hard copies need to be entered into electronic form. Perhaps can also use the lake model to fill in gaps in the data.
6. Historical metrological data has been sent to Denmark
7. Ongoing: sampling otholiths to determine growth rates for commercially important fish (2016-2018): need to organize monthly sub-samplings for otholiths and establish contact with BMUs
8. Updated information about fish growth rates important to include in the lake production model (can compare with historical data here too)
9. Ongoing: field sampling of present abundance of pelagic species (not prioritizing littoral species due to work load)
10. Hydroacoustic survey cruise equipment has arrived at Kigoma for some testing
11. Hydroacoustic phase 1 includes doing calibration and measuring seasonal changes of biomass off Kigoma and hopefully one more site in the southern TZ portion to be

used for calibration because they can work with ring-net fishermen who fish during the day.

12. Hydroacoustic phase 2 would involve trying to survey the whole lake, not just the TZ side, as the pelagic species are highly mobile/migratory
13. Need budget help from LIC for the hydroacoustics – takes time to apply for this funding but they are supportive for the Kigoma area. LTA has no money so need to find additional funding for the full lake survey.
14. Larger discussion on need to be conscious about time needed for this survey and timing of Huruma's PhD – concern about quantity of Huruma's project and need for additional focus and help here – we plan to resolve these by the end of the meeting.
15. Fishing lights experiment over Sep-Dec 2015 looking at the effects of the transition from kerosene to LED lights (Rex and Spesho) – initial findings shared
16. Need to coordinate working with BMUs in Kigoma region between Huruma and Gideon
17. Can get help from others (at Aarhus or in the U.S.) on aging fish using otolith

WP4: Fisheries Management

WP leader: Paul Onyango (Robert Kayanda absent)

Graduate student: Gideon Bulengela

1. Proposal approved but still awaiting the research permit
2. Gideon Bulengela attended a methodology course in Denmark
3. Joan Brehm has been added to Gideon's Bulengela's PhD committee
4. Interview protocol has been developed for fishermen/boat owners and fishery/BMU officials
5. Preliminary field work successfully begun with Joan Brehm
6. Field sites tentatively selected: Kibirizi, Katonga, and Muyobozi
7. One developing theme is to explore disconnects between what fishermen think is happening in the lake, and what is actually happening
8. Still need tape recorder to audio record interviews (or consider getting a camcorder too?) as well as Envivo qualitative analysis software/training
9. Need to explore whether human-subject/ethical clearance is needed for this work. Joan Brehm should look into this from the ISU perspective.
10. Need to get research approved/affirmed by relevant political leaders at every level – list out who Gideon Bulengela needs to meet with and what steps he will need to go through in order to do research

WP5: Capacity Building and Dissemination

WP leaders: Charles Lugomela, Hans Andersen (not present)

1. PhD students are registered and can start their research: Gideon, Huruma, and Prisca. This was our main goal for this past year. All of them have now started at least some aspects of their research.
2. Prisca and Huruma hope to present their research at a conference this summer (International Society of Limnology)

3. Developing training workshops in monitoring/sampling/analysis/interpretation – trainings begun and ongoing
4. Paul gave a presentation about the fisheries reporting system being developed at Lake Victoria

Project Status Summary Year 1

Led by: Peter Staehr

1. Overall in good shape (Get slide summary from Peter)
2. Hydro acoustic survey about to begin (new)
3. Dissemination of knowledge to LIC (new)
4. Fish value chain analysis (new)
5. What is not done:
 - a. Buoy is late (supposed to be deployed in 2015)
 - b. Local dissemination missing (leaflet) – best way?
 - c. Digitizing of historical data
6. Plans for year 2 (get slide summary from Peter)
7. Providing local information (such as weather data?)...?

Fishermen Workshop Planning

Led by: Charles Lugomela

Present: Ishmael, Joan, Paul, Mangus, Gideon, Prisca, Huruma, Mbonde, and Ben

1. Workshop to be held on Thursday morning (about 9am-1pm) at TAFIRI
2. A very humble request for Mangus Ngoile to facilitate
3. Objectives: “How we will define success?”
 - a. Create awareness about CLEAT
 - b. Understand what the local fishermen need/want and use that to help our future planning (but be careful about not setting up unrealistic expectations of how CLEAT can help)
 - c. Be a resource for any questions they may have
 - d. Work towards a common understanding of what’s happening in the lake
 - e. Mobilize fishermen to participate/support CLEAT
 - f. Mobilize fishermen to be more involved in fisheries management
4. Keep it interactive and start by letting the fishermen talk first
5. Invite 20ish participants from Katonga and Kibirizi
6. Specify the criteria of the kind of participants we are looking for: regional fishery advisor, municipal fisheries officer (Zechariah?), BMU chairmen, village chairmen, fishermen, boat owners, etc...
7. Be clear about what participants can expect: no compensation for participation but refund transportation costs and possibly offer refreshments/food?
8. Questions to ask:
 - a. What do fishermen know/understand about the lake/fishing?
 - b. What are the changes fishermen have observed in the lake/fishery?
 - c. Why do they think these things are happening?
 - d. How have fishermen been coping with the changes?
9. Program outline drafted

CLEAT Code of Conduct

Led by: Catherine O'Reilly

A draft policy was discussed. This was then revised based on comments by those not present (in brown text). The final version was approved by all project members.

Hali ya hewa/CLEAT project policies

Code of conduct and values

The project values transparency, rigorous science, collaboration, communication, trust, and fun! We expect to be treated, and to treat each other, with respect, fairly, and as equals regardless of gender, religion, race, nationality, age, career stage, or disciplinary expertise.

Authorship policy

The Ph.D. students will have initial primary control (first authorship) over manuscripts that are directly related to their stated objectives. As other ideas emerge and approach the stage at which a manuscript might be possible, we expect that all project participants **within the work package plus other involved project participants** will be informed and given the opportunity to participate in manuscript writing. In order to be considered a co-author, more than one of the following key activities must be done: contributing data, contributing analyses, developing figures/tables, contributing ideas and/or interpretations, writing. In addition, all co-authors must contribute to the development of the manuscript by providing critical feedback on the writing and/or editing AND must read and approve the final manuscript. Authorship order should be discussed early on and revisited periodically; we encourage authorship attribution statements. The lead author (first author and the corresponding author) is expected to coordinate and manage the communication and activities needed to guide the manuscript forward, as well as take on duties associated with submission, **revision, re-submission** and be the corresponding author. All authors are expected to commit time to manuscript development and respond to requests and complete any activities within a timely manner. People that have contributed to the manuscript by providing only one of the key activities should be included in the acknowledgements. Acknowledgements should include funding source ('This project was supported by the Danish Ministry of Foreign Affairs/DANIDA'; 'We acknowledge the participation of local residents'). We encourage authorship for reports, conference presentations or posters, etc. to be more inclusive, as the expectations are not as high as for peer-reviewed publications.

Collaboration Agreement

The project welcomes interactions with people outside the initial team that could enhance our project. Please introduce and put any interested parties in contact with Peter, Ishmael or Catherine, as a way to manage overlapping interests and coordinate activities. In general, our project expects that external collaborators will be financially independent (although they may leverage project resources such as logistic support) and that they will make reasonable efforts to participate in capacity building through training,

acknowledgement, and co-authorship. A copy of all data, metadata, and as appropriate, derived data, collected in conjunction with these collaborative projects will be provided to TAFIRI for archiving; these data will be placed under embargo (cannot be used for publication without permission and opportunities for co-authorship) for a time period to be agreed upon by the collaborators and the project in order to allow the collaborators to have opportunity to lead publication of the research. The details of the agreement will be provided in writing to TAFIRI, CLEAT, and the collaborator.

Data sharing and intellectual property agreement

During the project, data collected by the Ph.D. students and directly needed for their dissertations cannot be used by other people unless it does not impinge on the manuscripts that those students need to write (see Authorship policy). The use of data should always be by permission of the person (people) who was primarily in charge of data collation, who should be offered the opportunity to engage how the data are used for publications, etc. (however, providing data does not guarantee authorship on manuscript). Data and intellectual ideas generated or contributed in the context of this project are considered to be property of the project. **Any numerical model developments, which are based on existing open source models (e.g, released under a GNU General Public License) will, of course, respect the open source license agreement.** Datasharing with people outside the project should be done in consultation with the project (see Collaboration Agreement).

Conflict resolution

It is important to make sure our team resolves disagreements to remain productive. We encourage all project-related collaborators to contact any member of the lead team (Peter, Ishmael, or Catherine) or anyone else on the project to inform them of emerging conflicts or frustrations, or for help discussing these things.

This version was reviewed and agreed upon by the entire project team on this date:
This policy will be revisited annually.



*Team
discussing
the Code of
Conduct*

Notes of interest: At UDSM, authorship credit is divided by the total number of authors (e.g. 1/8 per person if there are 8 authors). At TAFIRI, the first author receives 0.5 credits the remaining 0.5 is divided among the remaining authors.

Planning for Year 2

- Split up into two groups on Tuesday PM and report back Wednesday AM:
 - Working Package 1 and 2
 - Working Package 3 and 4

Note: the two groups approached this time a bit differently, as is reflected in the structure of the notes below.
- Tasks (record major activities on big sheet of paper – list and dates):
 - All WPs develop dissemination plans
 - Flesh out timeline with dates (to be compiled into a project calendar)
 - Identify publications (journals) and conferences
 - Match with original plan

WP 1 and 2: Limnology and Modeling

Led by: Ishmael

1. Activity (based on Log Frame)

- a. SOPs protocols updated, shared, reviewed; list of protocols – Prisca (beginning of May)
- b. Data analysis/management protocols need to be developed, written; organized data entry (May)
- c. Data archiving and data management – need a plan; database structure (Peter, Hans) (May)
- d. QA/QC plan—lab and field, add to SOPs during review (Prisca, Ishmael, Catherine, Peter) (May-July)
- e. Buoy protocols need to be developed for QA/QC and data transfer (Peter, Ishmael/TAFIRI) (start ASAP)
 - Need to plan deployment
 - Ship
 - Dissemination of data and deployment including local activities
 - Phone app
- f. Training TAFIRI staff and PhD students, so staff can do the monitoring activities (by July)
 - Weeklong biostatistics course (Peter, Ishmael, Charles) (next year before annual meeting, start planning in August)
- g. Buoy – initial observations for tampering, plan to deal with this tampering, sensitization
 - Sign on buoy (Peter and TAFIRI) (start soon)
- h. Remote sensing (Peter has started)
 - Do we collaborate with GloboLakes?
 - Technicians or Mbonde do this work
 - Protocols are updated for sampling
 - Possible collaborator: phytoplankton, Steve Thackery U.K.
- i. Converting to primary production in g Carbon

- Peter will lead the learning to how to do this with a colleague, Prisca will be copied (Aug)
 - Prisca will learn in Denmark
 - j. Denmark – need a detailed plan for the 3 month trip
 - Time for data analysis
 - Training in data analysis
 - Computers, software – Prisca, Dennis (in process, within next few months)
 - k. Training should be documented in general
 - Feedback from trainees (Ishmael and Prisca) (now to July)
 - l. Presentations at SIL – 31 July-5 Aug, plan for data analysis
 - m. Modeling
 - Set up continues – Dennis and deadlines/timeframe (Peter to ask)
 - Dissemination?
 - Activities in September while Prisca visiting Denmark
 - Confirm what data and software needed with Dennis (Prisca) (April)
 - Temp data and source (Kraemer and Catherine?) (April)
 - n. AUFF application – May 23 (Catherine and Peter) (April)
 - o. Denmark – coordinate visit to Denmark with DFC (Danish Fellowship Center)
 - Look at guidelines in DropBox
 - 3 months in advance – start in April
 - Aug 5 arrival due to SIL conference
 - Course Ecopath (fish) Aug 22-26 (Huruma)
 - Modeling of lake – how much time/where to stay? In Silkeborg? (Prisca and Dennis)
 - Data analysis with Peter in Roskiøde
 - Specialist in Denmark for additional 3 weeks to help with Huruma
 - 3 months stay
 - One manuscript to finish at beginning
 - One manuscript to work on after modeling work
2. Dissemination
- a. Presentations at meetings (all)
 - b. Stakeholder workshop – doing one now, plan one for southern part at next year's meeting (Charles and Ishmael) (Jan-Feb)
 - c. School children:
 - i. Essay and drawing competition: “Lake Tanganyika: Our natural heritage” – correct Swahili translation (Tumaini”/Hope?); also see Shedd Aquarium in Chicago, USA (Charles, Catherine) (Jan-Feb, March awards; planning starts now)
 - ii. Netlake has a template that could be applied to Lake Tanganyika
 - d. Networks
 - i. SIL – Ishmael to contact colleague about having an informal get-together associated with the African freshwaters session.
 - ii. Lake Volta project – organize social/networking activities (Hans) (Aug)

- iii. GLEON – July 4-8: poster (Prisca, Ishmael, Catherine)
 - e. Conferences
 - i. Money for TAFIRI, for students, and for UDSM – need to plan to use these funds
 - ii. Technical workshop at TAFIRI for UDSM staff in Jan/Feb/Mar (Charles) (Plan end of 2016)
 - f. News article – TZ paper in English (Ishmael)
 - i. Updates on the project (April)
 - ii. Group photo – Peter/Joan (tomorrow)
 - g. UDSM Research week – end of March (Charles) (start earlier)
 - h. Social media
 - i. Stories with photos on project web page(Peter)
 - ii. Youtube channel (Amani and Mbonde) – embed in CLEAT website (Peter)
 - iii. 1-min videos for youtube covering the lab, field, fish beaches.... more cut off from picture here
 - iv. Storify (Ishmael) (June)
 - i. Students
 - i. 2 manuscripts submitted by end of year
 - ii. Need a clear plan
 - j. Buoy app customized – GLEON (Catherine) (ASAP March-May)
 - k. Buoy deployment – local representatives (Ishmael) (now)
 - i. Lisa Borne for Nat Geo blog and GLEON (Catherine) (now/March-May)
 - ii. Invite TZ journalists/TV (Ishmael)
 - iii. COSTECH (Ishmael)
 - l. Policy briefs for awareness (Sept/Oct) (Charles and Johnny to draft)
- 3. Students
 - a. Mbonde – PhD
 - i. Phytoplankton composition
 - ii. Experiments (seasonal)
 - 1. Bioassay with nutrients in the lake
 - 2. Phyto PAM temperature and light (and nutrients)
 - 3. Mbonde ~ 2 days, review and revision (Peter)
 - iii. Funding?!
 - 1. University costs + 1 conference or so -- \$40,000
 - 2. Peter to ask DANIDA (April)
 - b. Papers by Prisca and others
 - i. Vertical gradients in primary production in LT (Prisca) (Dec 2016)
 - ii. Importance of water column stability for the distribution of nutrients in the upper mixed layer in LT (Prisca) (Dec 2016)
 - iii. Review paper
 - iv. Model paper (ask Dennis) (timing?)
 - v. Buoy paper and pp (Prisca) (May 2017)
 - vi. Nutrient deposition monthly – needs planning (Ishmael, Catherine, Dennis, Prisca)

*Need to evaluate the monitoring program after next year as we may be able to adjust for delays in the buoy data collection

WP 2: Modeling

Led by: Peter (Dennis absent)

1. Plan is to start setting up the model this year with Dennis and his expert modeling colleague, so not as much to report here. Peter will follow-up with them to confirm progress but currently things are ahead of track.
2. Prisca and Huruma will go to Denmark in August-September for a weeklong training on EcoPath and then Dennis will work with Prisca intensively over three weeks to integrate the data she has collected.

WP 3: Fisheries Production

Led by: Huruma

1. Coupling fisheries and lake conditions (Huruma)
 - a. Completion of data collection and compilation (15 June)
 - b. Presentation at SIL (30 July-4 August)
 - c. Training on Modeling (capacity building) (Aug 2016)
 - d. Scientific papers and reports – writing, review, and submission (Feb 2017)
 - e. Archive data (Data management proposal from Peter, including reorganising of Dropbox and establishing of common server for valuable data)
 2. Fish growth from otoliths (Huruma)
 - a. Fish sampling – multiple sites (to March 2017)
 - i. *Catching*
 - ii. *Length/Width*
 - iii. *Composition*
 - b. Trainings on extraction, reading, and calculations (April-May and Aug 2016)
 - c. Extraction of otoliths – focused in Kigoma (to March 2017)
 - d. Progress report for the otoliths (February 2017)
- New task: Hydro acoustic surveys
 - Phase I – Kigoma to Mahale (Huruma) (??? To Dec 2016)
 - Phase II – Regional/lake-wide (TAFIRI?) (timeline TBD) **Who is responsible?**
 - New task. Fishing effort study (LED light)
 - LED study vs traditional lamps. (Humruma/Magnus)(2017)
3. Littoral fish sampling (and possibility of including line fishermen – TBD?) (Ben + TAFIRI)
 - a. Identify sampling sites (March 2016)
 - b. Collection of sampling gears and develop protocol and proposal (March-Dec 2016)
 - c. Sampling (2017—?)

WP 4: Fisheries Management

Led by: Johnny and Gideon

1. Review fish catch, practice, and gear (Ben)

- a. Completion of literature collection (May 2016)
 - b. Review of the literature and possible publication (June-Aug 2016)
2. Investigate food supply from fisheries (mostly Paul) (all by Sep 2016)
 - a. Literature review
 - b. Household survey on food supply
 - c. Fish market and processing (Johnny) (March-Sep 2016)
 - d. Identification of fish products—cross-reference with fish value chain analysis
 - e. Writing report
3. Policy brief (March 2017)
 - a. Outline for briefing note including fishery, processing, markets, and value analysis (Johnny/Charles and all) (now)
 - b. Meeting with policy makers (WG5) (March 2017, connected with annual meeting)
 - c. See below for draft briefing note outline from Johnny
4. Improved stock information system (Johnny and WG4)
 - a. Draft and approve proposal for SIS (through Dec 2016)
 - i. Data input from buoy, fishermen (catch/price), traders (fish types/prices), commodities (products), environmental/scientific
 - ii. Presented data to include catch/available fish, prices, products, weather data, environmental situation/pollution/hazards,
 - b. Development of system (after March 2017)
 - c. Implementation (after March 2017)
5. Investigation of local skills, needs, and problems (Gideon)
 - a. Prepare 1-page project summary in Kiswahili for use in interviews (March 2016)
 - b. Procurement of N-vivo software, transcription software, and digital recorder (Gideon to work with Charles and others) (March 2016)
 - c. Training on software (March 2016)
 - d. Introduction to local authorities at every level and in each site (April 2016)
 - e. Collect data/observations and conduct interviews – 4 trips (April-Dec 2016)
 - f. Preliminary data processing (April-Dec 2016)
 - g. Data processing and writing (possible return to field) (Jan 2017 onward)
 - h. Take a philosophy course (Paul Onyango to arrange in 2017)
 - i. Submit full manuscript for student paper competition at ISSRM (April 2017)
 - j. Conference presentation at ISSRM (International Symposium for Society and Resource Management) in Umeo, Sweden (June 19-22 2017)
 - k. Return to debrief with interview participants/officials/fishermen (Jan 2017)
 - l. 2 manuscripts submitted to journals for review (Dec 2017)

Draft Briefing Note Outline

Lead: Johnny

Includes: 1) Fishery, 2) Processing, 3) Markets, and 4) Value adding

The task as described in the project application: *....on-site review of actual catches and the type of equipment will be conducted at 3 locations that will map the fishing practices, methods and equipment in use. This will include types of boats, fishing gears etc. Results and*

findings will be communicated as a policy brief (Task 4.3) to the stakeholders in the project in order to build-up a platform for dialog and dissemination of information

Based on the achieved knowledge from the first years project activities in will instead be done by the preparation of a **briefing note** for relevant policy makers and stakeholders as a dynamic working document, which can be successively revisited and updated when new relevant information regarding the above mentioned areas are produced by WP 4 and the other WP's (*if necessary*).

The briefing note shall be used and presented with the assistance of WP 5 in workshop for regional and local stakeholders(?) in connection with the next annual meeting in 2017. WP 4 will provide the professional input and be speakers at the workshop, which is to be planned and fully organised by WP 5.

The briefing note will include presentation of the achieved relevant data and results from all the WP's but especially WP 4.

The briefing note should lead to a policy brief with final recommendations for improvement. Not meaning that improvement initiatives can be suggested and implemented during the project period.

1. Fishery – Presentation of the artisanal fishery in Lake Tanganyika including (*based on 3 sites?*):
 - a. Fishing units and types
 - b. Fishing gear
 - c. Summary of historical data on catches of xx and yy per year (*other available data about the catches can be included, for example seasonal fluctuations, prices etc.*)
 - d. Data from the buoy/models on available stock (TAC) (*can it be used?*)
 - e. Employment
2. Fish production/processing
 - a. Present products/productions
 - b. Generic design for proper and hygienic fish processing facility
 - c. TAFIRI drying/smoking kilns?
3. Markets
 - a. Present markets (beach)
 - i. Numbers, distance from landing sites, size, traders etc
 - ii. Product prices
 - iii. Distribution/logistics
 - b. New markets (market hall with ice and chilling facilities)
 - i. Numbers, distance from landing sites, size, traders etc
 - ii. New increased prices
 - iii. Export market/possibilities.
 - iv. Distribution/logistics
4. Value adding

- a. New products, could be frozen whole fish, gutted fish or even filleted fish for high paying domestic or export markets (*hotel, restaurants etc in Dar and other large cities?*)
- b. Suggestions for improvement of quality, for example the introduction of ice and insulated containers/boxes on board the fishing boats.
- c. Exchange of information with LIC project about fish value chain/PAUL

WP 5: Capacity building and Dissemination:

Led by: Charles Lugomela

1. Three PhD scholarships (Charles) (2015-2018)
 - a. Prisca Mziray, Huruma Mgana continues with data collection and analysis
 - b. Gideon gets research permit and embarks on data collection
2. Conduct PhD courses covering the themes of lake ecology, climate change, fisheries, and management (Charles and others) (2016-2018)
 - a. DASF has developed a PhD program, which has been approved by the senate
 - b. Awaits approval from TCU before implementation
3. Training workshops in lake monitoring, field sampling, data analysis and interpretation as well as application of models (Kimerei, Charles, and Peter)
 - a. Training of TAFIRI scientists have been conducted and are ongoing
 - b. Biostatistics training at 2017 annual meeting (Peter)
4. Integrate students and researches into existing international networks (Hans)
 - a. Connect with Lake Volta project
 - b. Include social networking activities
 - c. Follow-up announcement in respective networking websites
 - d. Networking during scientific meetings (e.g. SIL)
 - e. Attend GLEON meeting in July 2016? (Ishmael, Prisca, Huruma)
 - f. Paul will send out email about connecting into TBTI (Too Big To Ignore)
5. Open Stakeholder workshops to communicate project findings (2016-2019) (TAFIRI/Ishmael assisted by Charles, Hans, and others)
 - a. Planned in coordination with 2017 annual meeting
6. Introduce local fishermen and citizens to sustainable lake and fish management
 - a. Taking place on March 17, 2016 (see notes from Monday afternoon, 14 March)
 - b. Gideon and Charles will write up notes/summary/report on the workshop
7. Training of local school children ('the lake users of tomorrow') (see notes from earlier this morning (WP 1))
 - a. Essay and drawing competition on "Lake Tanganyika our Natural Heritage"
 - b. Netlake has a template that can be applied to LT (Peter will provide)
 - c. Timeline: Jan to Feb 2017 with awards to winners during the 2017 annual meeting
8. Dissemination to different target groups
 - a. Use project website: include photos/stories embedded on the website, needs content submissions from everyone
 - i. Joan and Gideon will submit story about Beatrice

- ii. Peter will submit story about the development of the buoy
 - iii. LED story from Huruma, Catherine, and others
 - iv. Prisca and Ishmael will submit a limnology story
 - v. Magnus and Paul will work on a fisheries story
- b. Make sure to include links to relevant partners/institutions throughout posts
- 9. Policy brief based on research results
 - a. Summarize project results and recommendations
 - b. Charles and Johnny to work together with input from everyone
 - c. Final draft aimed for Sep/Oct; Timelines – toward the end of the project
- 10. Participate and present research at scientific meetings/conferences
 - a. Presentation at SIL—Huruma, Prisca, Ishmael
 - b. Presentation at ISSRM—Gideon (June 19-22, 2017)
- 11. Other methods:
 - a. use social media, e.g. YouTube (short videos on lake sampling, lab analysis and /or interviews with fisher folks, etc.) – Amani and Mbonde
 - b. Storify – Ishmael
 - c. Newsletters, newspapers, etc.
 - i. News article to local English papers (Ishmael)
 - ii. Peter – news article to Danish paper
- 12. Access to monitoring data via website and real-time access to buoy data using phone application
 - a. Buoy application system – Peter to handle
 - b. Media during buoy deployment (environmental reporters like Vedasto Msungu)
 - c. Officials (Gov't and Danish Embassy) and local reps invited to deployment
 - d. Lisa Borne from NG Blog and GLEON – Catherine
 - e. COSTECH may also fund some dissemination activities – Ishmael
 - f. Annual Research Week Exhibitions at UDSM – Charles
- 13. Contribute to public lectures and interviews in the media
 - a. Towards the end of the project to share findings
 - b. Peter/Kimerei/Charles/Hans to spearhead
 - c. Nature Conservancy Great Lakes Conference to be held in Africa in 2017 (Ishmael)

Other updates/planning issues

1. Benjamin Kramer (present last year, former student of Pete McIntyre) did not get funded yet to do a postdoc with CLEAT but continues to pursue funding opportunities and remains very interested in collaboration
2. Need training of other TAFIRI staff on equipment so that there is greater long-term capacity and also so that surveys/data collection can proceed aside from the PhD students themselves
3. Still need a project summary developed in Kiswahili for local distribution (Joan and Gideon)
4. Developing local issue: attempt to restart purse seining in LT (by investors from Kigoma who bought trawlers from Zambia) but TAFIRI has been part of lobbying against it. The rejection was recently given but is being appealed. LIC needs help

with gathering data to make an argument against restarting purse seining. CLEAT could be a resource project that helps with in some ways with data here. Need to figure out what the timeline is here. Five hydroacoustic surveys have been done through the years, two sets of results were not even usable, and the remaining three sets of results varied very widely. So need to be realistic about the ability of any one hydroacoustic survey to provide definitive assessments.

5. Need to figure out data archiving solutions for CLEAT and TAFIRI, along with data policies that specify access/usage.
6. Need to figure out specifics of Huruma's focus/scope and papers to be submitted
7. Question about holding a future annual meeting in Denmark?
8. Question about proposing to host a GLEON meeting in 2019 focused on LT? (discuss further at the next annual meeting)
9. Discussion on how to help facilitate a sabbatical for Ishmael Kimerei
10. Ishmael suggests that we help provide TAFIRI-Kigoma/Amani with a better camera for his work (done. Ben Lowe donated his camera)
11. Catherine notes that all photos used should include photo credit
12. Need to confirm next year's annual meeting date as soon as possible

Training of Ph.D. students and TAFIRI staff - March 2016

Training has been conducted on use of field and laboratory equipment as well as on basic data analysis.

Field training was performed as part of a night time investigation of how different light sources attract pelagic fish.

Laboratory training in use of equipment and in data analysis was provided over a series of days

1. Use of field equipment

- EXO sonde **and interpretation of results from these**
 - o Field deployment
 - optimized use of instrument and way of deployment
 - o Data analysis
 - Preparation of data for analysis in SAS software
 - Training in data analysis with SAS software
- Light measurements
 - o Field measurements
 - Design of sampling plan
 - o Data analysis
 - Import and organization of data
 - Interpretation of results

2. Laboratory analysis of samples and further data analysis of results

- Spectrophotometer
 - o Nutrients
 - Methods files made
 - o Spectral analysis of CDOM and particulate matter

- protocol written for sample preparation and analysis
- Methods file made
- Training in data analysis with SAS software
- Phyto PAM
 - Primary production measurements
 - Protocol written for use of apparatus
 - Preparation of data for analysis in SAS software
 - Training in data analysis with SAS software
- EXO sonde
 - TSM measurements
 - Installation and calibration of turbidity sensor
 - Made TSM vs turbidity calibration curve
 - Chl calibration



Ph.D. students discussing during team meeting

Stakeholder's Workshop

17 March 2016

Attendees

This meeting was held at TAFIRI- Kigoma office and it was attended by fishermen, boat owners, fish processors from Kibirizi and Katonga landing sites in Kigoma-Ujiji, and fisheries officers from Kibirizi and Katonga landing sites. Others were chairperson of Katonga Village and Kigoma Region Fisheries officer. From the CLEAT project, University of Dar es Salaam professors, the TAFIRI director, and two of the Ph. D. students attended.

S/N	NAME	OCCUPATION/INSTITUTION
1	John Kimondo	Village chair person- Katonga
2	Abdallah Hilali Shariri	fisherman
3	Edmund Kajuni	Fisheries Officer
4	Mtesigwa Zacharia	Fisheries Officer
5	Mariki Mdetele	Fisheries Officer
6	Hassn Seleman	Fisherman- Katonga
7	Leonard Sadick	Fisherman- Kibirizi
8	Nunda Molisi	Fisherman -Kibirizi
9	Anyesi Constantino	Fish processor
10	Siyajari Jacob	Fish processor
11	Chausiku Issa	Fish processor
12	Ezekiel Ibrahim Nyamgele	Boat Owner
13	Awazi Anzuruni Katahu	Boat Owner
14	Jumanne Seleman	Chairman – BMU Kibirizi
15	Ahmad Omary	Secretary- BMU Katonga
16	Ritha J. Mlingi	Fisheries Officer Kigoma Region
17	Tumaini G Luhingulanya	Fish processor
18	Silvester S. Kibonge	fisherman
19	Hamza Juma	Boat Owner
20	Ally Mzilla	Boat Owner
21	Charles Lugomela	University of Dar es Salaam
22	Gideon Bulengela	University of Dar es Salaam
23	Paul Onyango	University of Dar es Salaam
24	Ismael Kimirei	TAFIRI- Kigoma
25	Mgana Huruma	TAFIRI- Kigoma
26	Magnus Ngoile	University of Dar es Salaam

Agenda

- a. Welcome and introductions
- b. Give out questions and break up into four groups
- c. Groups come back to share
- d. Summary of what has been said
- e. Break – refreshments
- f. Scientific presentation on the lake/fishery and observed challenges/threats
- g. Explanations for these observations
- h. What can/should be done management-wise
- i. What CLEAT is about/doing

Stakeholders Workshop Notes

Taken by Gideon Bulengela

Opening

Kimirei opened the meeting by welcoming the participants and make a short introduction and invited all participants to feel free to speak their ideas and opinions.

Ngoile was the moderator of the discussion. He invited all participants to the meeting on climate change and fisheries of Lake Tanyanyika. Ngoile pointed out that it is the fishers who know better about the Lake than the scientists. Thus, scientists who were in the meeting will not talk much but rather they will be listening much and the primary stakeholder of fisheries - the fishermen will be expected to talk more. Then Ngoile invited Paul Onyango to explain the modality of the discussion

Paul explained that the intention of the meeting was to exchange ideas about fisheries of Lake Tanyanyika. That researchers have little information about the lake so they expect to learn more from the fishermen. He informed the participants that there will be two sessions of group discussions. Four groups of four members each were formed. Each group was composed of at least one fisherman, processor, and boat owner. In the first session two issues were to be discussed in the groups, namely

Draw a sketch map and indicate where you go to fish

What good things/story can you say about the Lake? What changes have you observed in areas where you have been fishing?

In every group, members will appoint one person who will be taking notes of the discussion and then one person will present to the meeting what the group has discussed. During group discuss sessions, CLEAT team members were assisting the groups whenever they needed assistance.

Group presentations

Group one.

Fishing areas

- Kasegela
- Mtanga
- Nondwa
- Katabwe
- Kitwe

- Kasekwa

Fishing gears

- Kusoza-pedals (the first technology)
- Use of engine boat – Horsepower - PH 7-15 for short distances (second phase)
- Currently engine boat of PH 40 to 60 PH. With this technology we are able to go far as catch has declined in the near shore areas

Challenges

- Decline of catches-
- Length of fishing nets in the past we had fishing net of 30m to 100m, now we have of between 300m to 400m

Good things about the Lake

- Employment to majority
- Increase of fishery product traders- some from America, Australia and Congo

Group two

Fishing areas

drawn a map showing where they go to fish, the areas are:

- Mtanga- kazinga peninsula
- Kibodeleo
- Muyobozi
- From the Lake shore to the deep waters it is 10 kilometers. We usually go to the north or south of the landing sites. There is good stock of dagaa in the south. Availability depends on season. In one season we may catch more dagaa and another season we can catch more migebuka

Fishing gears

- Before 1980, we used “kusoza”- pedals
- From 1985- 1990 we used boat engines
- 1996-2000 we used HP 40 to HP 75 engines

What has changed

- From 1984 to 1995 catch was good
- From 1996 to 2016 there is low catch.

The following are the causes of low catch

- Increase of temperature
- Decrease of wind in the Lake- if there is storm in the Lake fish which are in the deep water are brought to the surface area of water
- Population growth- people have increased in Kigoma but the catch has not increased
- Poor fishing gears

Good stories about the Lake

- Conservation measures have reduced illegal fishing by 80%
- Decline of piracy in the Lake

After the presentation, one member of the meeting wanted more clarification on what was presented - “the presenter mentioned that one of the challenges is increase in temperature (*kitukutu*), however, usually during this period the catch is good, but the presenter said that catch is low, can you clarify this?”

Answer.- from 1985 to 1990 temperature was high and winds was high but from 1996, temperature is high but the wind is low.

Group three

Fishing areas

- We go to north or south
- In the south we go to kabimba- “mataa”
- In the past we were going short distances

Challenges observed

- Change in fishing technology- in the past we were using pressure lamps. The light of pressures lamps usually penetrates more than other type of lights, so catches were good. But now we are using solar lights, it seems that solar light does not penetrate much to the water so the catches have declined.
- Population growth

Good stories about the Lake

- Improved livelihood- we are able to send our children to school. But now days elders do not encourage their children to engage themselves in fishing activity because of low catch

After the presentation, the moderator allowed members to ask questions based on the presentation made by group three

Question; “the decline of catches have been noticed since 2000. In 2010 we had good catches but since then especially after the introduction of LED lamps (solar lamps) the catch has went down, we don’t know why this is the case may be you researchers can tell us why. But generally there is great change in the Lake”.

The moderator said that, this question be reserved, it will be discussed in detail later on

Group four

Fishing areas

- Katonga – where we fish kalumba and migebuga
- Mwamahunga
- Ujiji- we usully fish dagaa
- Kagongo, namtoga, kagunga- we usually fish dagaa

Changes observed

- Decline of catches
- Changes of fishing technology
- Use of kawesulu-
- Kipe cha kusoza- a pair of boats that uses pedals
- Kipe – a pair of boats that use engine.
- Use of better boats
- Decrease of wind- *kusi, kungwe, lukuga (local names of winds)*

Good stories about the Lake

- The Lake provides employment
- People are able to pay school fees, build better houses,
- It builds social ties- relationships develop in fishing activities

- Fishers do contribute for social services such as building schools and hospitals

After the discussion members were allowed to ask questions or give additional points Kirimei added that in Kigoma the use of *kipe* was copied from Burundi in 1972. Before 1972 the dominant fishing gear was kawesulo (scope net) and yologwe (pursel). One fisherman added that after the introduction of *kipe* in 1972, the use of kawesulo (scope net) started to decline. By 1977 pressure lamps were introduced. In most cases we were adopting fishing technology from Congo DRC. By 2000s solar lamps were introduced. Solar lamps are cheaper compared to pressure lamps. However, people are debating about solar lamps, some say that it leads to low catches while others say they get better catches.

One member of CLEAT team wanted to know who are the majority of fishermen between local residents and migrants.

Answer: the majority are migrants – for example in one *kipe* (usually one *kipe* has 6 persons) residents might be 2 and 4 are migrants. “we don’t like fishing, it is very difficult activity, it has its own people” (he added).

After the discussion the moderator (Ngoile) made a summary of the discussion. This summary was not only highlighting the major issues discussed but was an attempt to make members think more about the presentations and asked questions that directed the participants to the further discussions about the Lake. These are;-

Fishing areas - do you think if we improve fishing technology and go more far we can get better catch?

What has changed- it has been noted that changes are many such as fishing technology (boats, nets, lights), we need to work more on these, do the changes bring positive or negative results?

Kimirei added “I can see that you people have much knowledge, I should say your knowledge surpasses higher degree holders.

For some you who have talked about decrease of wind it is true, it tallies with science. In science this process is called “mixing”. Usually wind mixes water in the Lake. Again, you have mentioned deforestation. It is true that most areas where trees have been cleared such as msalaba, catches are very low. Moreover, what you have said about population growth is also true. Population growth goes hand in hand with increased fishing pressure. One of you have mentioned changes in catches in 2004. The increase in catch was caused by el –Niño.

Some of you have mentioned that the light of solar lamps is weak compared to pressure lamps but research findings have indicated that solar lamps have brighter light compared to pressure lamps. Again solar lights are cheaper. In average a pressure lamps consumes 20 liters of kerosene per night (about Tsh 40,000/) while for solar lamp you need only Tsh 5000/- to recharge it.

So we request you to help us on how we can move forward in an attempt to address the problem.

After the discussion, the moderator requested the groups to go for the second session of discussion. In this session participants were asked to discuss two challenges which they

consider to be major challenge facing fisheries of Lake Tanganyika. Again they were requested to suggest two possible ways to address the challenges.

Phase two of group presentations

Group one

Challenges

- Climate change
- Poor fishing gears
- Insecurity

Suggestions

- Conserve the environment- stop fishing immature fish, reforestation, stop cultivation along Lake shores
- Improved fishing gears such as fish finder so that we stop “trial and error” type of fishing
- Ensure improved security in the Lake
- Researches should give us feedback of various research findings obtained in various researches so that we can improve the situation

Group two

Challenges

- No fish finder
- Climate change- low rainfall, decreased wind,
- Water pollution from industries
- Cultivation along water sources
- Global warming due to industrial

Suggestions

- Preserve trees- such as makankakanka (a particular tree species)
- The government should help us to locate where fish are by use of better technology

Group three

Challenges

- Climate change
- Increase in export fee for fish products- in the past export fee was 0.6 USD per kg but now it is 1 USD per kg. this has resulted into decrease in number of traders and thus decline in income.
- License charges are very high
- Insecurity
- Lack of access to loans

Suggestions

Introduce seasonal fishing

- Protect/establish breeding sites
- Reduce taxes
- Ensure security
- Have access to loans in order to buy fishing gears

After the presentation one member wanted to know the estimated quantity of fish spoiled due to lack of market.

Kimirei replied that the problem is not such big, but the processors can tell more.

Regarding to taxation, it might be the reason why in the past three years export had declined and import from Lake Victoria has increased.

Another member (woman fish processor) added that the big problem that is facing fishery in the Lake is ring nets. Ring net destroy even the breeding sites because it takes almost everything, this contributes to low catch. It is not true that export is going down, fish traders come if there is commodity.

Group four

Challenges

- Fishing in bleeding sites
- Poor fishing gears
- Dependency on fishery

Suggestions

- To identify and protect bleeding sites
- To educate fishermen and traders
- Ensure community participation in fisheries issues
- To find alternative sources of income- such as fish farming, small business

After the presentations, members were asked to discuss generally what were presented by the groups.

1st contributor (Jesca) – fish processor

- Fish spoil is due to distance- if fishermen go very far to fish and it takes many hours on way back to the landing site, fish do get spoiled.

2nd contributor (Zacharia- fisheries officer)

- It is important to establish seasonal fishing/ close for sometimes like is done in Lake Victoria.
- Ring net is a serious problem even to us who are implementers of the fisheries law. According to the law, ring net is allowed but it is not allowed to use it below 200m. however, monitoring of this is very difficult.

3rd contributor (Ali Mzila, Katonga)

- “We are not catching anything but why the license fee/charge is increasing annually, why?”
- It is true that there are changes in the Lake, catches are declining sharply, we need to find out the reasons for this.
- Others have touched about insecurity- it is true that insecurity is a problem. We fear to go far because of insecurity. If we were able to go more far, we could get better catch. I should ask my colleague to think about this as we discuss this matter.

4th contributor (Village chairperson Katonga)

- In my investigation, ring nets on the north of the Lake have affected fisheries very much
- Also security in the north is very poor. For example during kalasaji (period of warm water and good catches) no one goes to fish because of insecurity
- I agree that wind has decreased

- I suggest that ring net be stopped. I suggest that security be improved. Burundi is more secured than Tanzania

5th contributor (Woman- processor)

- We had a meeting here in August 2015 and we talked much about the same problem- the ring nets. As processors we highly condemn the use of ring nets.
- If we decide to close (introduce seasonal fishing) it is women who will suffer most.

6th contributor (a man)

- It is good now if we make conclusions and find the way forward. As fishers we want the situation improved that is why we are here. People have mentioned a lot of challenges. But now let us look at what can be done to improve the situation.
- On small size mesh/net, this is the product that is found in the market, so we fishermen are punished for using them while the problem is not us it is the importers of this product. It is true that allowed size of net is 6mm to 10mm. Now why are we blamed and punished? Let us look at the nature of the problem- what has been done to people who import nets of less than 6mm? We suggest that agents of fish nets should import allowed size of fish net.

7th contributor (a man)

- Since early this morning we have discussed a lot, I should say that, fishery of Lake Tanganyika is trial and error; we are not sure of where we can get good catch. We are requesting equipment which can help us to know where fish are. We have been fishing for years but we are still poor, we want to improve our living standards.

8th contributor (Paul Onyango)

- Thank you for your opinions, I have learnt a lot, for sure you are more knowledgeable. You have given your opinions on the challenges on the Lake. In my observation, your ideas resemble to scientific observations. So this is an opportunity for us to find a way.
- Decline of fish is a global issue, now what is the solution to this problem? In most cases we human beings tend to blame others, let us not blame anyone.
- On ring net the fisheries law of Tanzania does not prohibit ring net. So law enforcers should not be blamed. What is required is for fishers to give their suggestions to TAFIRI and your Constituency Representative (member of parliament) who have power to influence change of the law.
- Regarding the changes we are observing, *mradi wa hali ya hewa na uvuvi* (CLEAT) will clarify issues such as food web, mixing of water and weather forecast as equipments will be installed to collect such information. This will help to explain some of the concerns raised in the discussion.
- We request you to collaborate with CLEAT by making sure that the installed equipments such the bouy is protected for sustainable utilization. You are good ambassadors to other community members.
- The problems we have discussed should not end here, but you can use different mechanisms to make sure that some actions are taken in the future. For example explain them in village meetings to make sure that your cries reach the responsible authorities.
- 9th contributor (From Regional Office)
- I should thank TAFIRI for involving primary stakeholders in the sector in this meeting. Regarding security the regional team for security has made a lot of efforts,

piracy has decreased, I hope you are witness of this. Please collaborate with us in this effort, do not hide migrants because some of them engage themselves in piracy.

- I request TAFIRI director and collaborators to continue updating us on what is going on. Give feedback also to fishers.

10th contributor (Charles Lugomela)

- I should thank the organizers of this meeting, as one of coordinators of the project with our PhD students will be monitoring changes that are taking place on the Lake. In that way we will be in a position to provide reliable information/explanation on the reasons behind those changes.
- Some equipments will be installed to monitor the Lake. I request you to be cooperative to the project team including those who will be visiting your places.

Moderator: we as project team will prepare a report of this meeting in Kiswahili and give it to you. Then the moderator invited Kimirei to give a few words to close the meeting.

Kimirei: We are going to ensure that this project is different from other projects by being close to stakeholders, sharing information and giving feedback to every meeting. Our intention is to get answers to these challenges we have discussed. We will cooperate with other institutions responsible for fishery such as the Ministry, Regional and District offices and inform them of these concerns.

We apologize for spending much of your time than we anticipated.

We will give you project T-shirts as sign and message to others that the project is taking place.

I thank you for coming and I request you respond positively when we shall call you again for further meetings.



Attendees at the stakeholder workshop

KUNDI 2

1. Jibu la Swali No 1.

- Sisi zote wali wa kuo la mambo ya kigoma wiji tunavyo. Kunaio ~~hufika~~ Rasi ya Kibiriga Kijijicho hufika kuelekea kueleka Mnyabazi Kijijicho Mwanazungu.
- Kutoka Ufukwani Kwanza gegini, tumatumie umbali wa kilomita kumi (10) kwa ajili ya kuvua samaki aina ya Mugebika wa Sangara.
- Kwa tumatumie kilomita tita (3) hadi Siba (3) kwa ajili ya kuvua samaki aina ya dagaa.

2. Jibu la Swali No 2

A) Kwanza mwaka 1954 hadi 1995 umu ulikuwa msuzuri mapato ya yabikwa mengi ya dagaa wa Mugebika.

2016 kwanza wa

Mabadiliko Malubwa, Uuvi Umochumi Jan

KUNDI NO 2

A) Sababu: Mabadiliko

- Ya hali ya hewa; kuongezeka kwa joto, kupungua kwa mvua wa kupungua kwa Upepo Ziwani
- Ongozeko la rosta

B)

- Mabadiliko pia yanatokana Uhaba wa Zama za kisasa.

Jibu No tatu (3)

- Ulenzi wa mali-ambi, Umepungua Uuvi haramu.
- Wazi Umepungua kiasi cha kutoka Ulenzi wa Mazingira.

KUNDI NO 2

1) Chango mto zinazo kuzua mafuniko

- hali ya hewa melumoni.
- Uhaba wa Mazingira.
- Uhaba wa Zama za kisasa (kama Uhaba wa Mazingira).

2) Viwanda vimekuwa vingi duniani

Vinavyo kwanza ni vingi duniani

- kutuza miti, kutuza miti wa Mbonde.
- tumatumie, kupata Zama hizi kama Mazingira wa Banioko ili wote wawazi kutuza Sehemu ambapo kuna petikama Samaki kwa wingi.

KUNDI NO. 1

1. Maeneo unayokwenda kuvuliwa

- Kasegela - kwa kasia ni dakika 30
- Mtanga - kwa kasia ni dakika 30
- Kalalangabo - // -
- Nonchwa - // -
- Katabe - // -
- Kitwe - // -
- Kakeke - // -

2. Kitu kilichobadilika katika Maeneo mnyokwenda kuvuliwa

- Matumizi ya injini ya boti HP 7-15 tulikuwa tunapanala dakika 20 baada ya hapo tukianza kutumia HP 40-60 tunapanala umbali wa saa moja na nusu mpaka masaa mawili tunaenda kuvuliwa daga na samaki kibar tulichogundua ni upungufu wa mazao ya uvuvi.
- Kuna kipindi hali inakuwa mbaya na kuna kipindi hali inakuwa nzuri lakini haitikii kipindi cha nyuma.
- Urefu wa kamba ya nyavu sika za nyuma tulikuwa tunatumia yadi 30-50 sasa tunatumia yadi 100.
- Urefu wa kamba ya nyavu sasa tunatumia mita 350-400.

3. Mambo mazuri kuhusu ziwa

- Ajira kwa watu wengi wa kigoma ^{mkoa wa}
- Ongezeko la wafanyabi ^{mkoa wa uvuvi}
- Kutoka ndani ya nchi na nje ya nchi ^{mkoani kigoma}

KUNDI NO. 1

- Changamoto zinao wazua kunufika na ziwa.
- Mabadiliko ya tabi za nchi na hali ya hewa
- Zana duni.
- Kutokea na usalama wa wavuvi ziwani

2. Mapendekezo ya namna ya kukabiliwa na changamoto hizo

- Kutunza mazingira ya nchi kavu na majini
- Kupata vifaa vya kibasa ambavyo vinarujitia mvuvi kujua samaki wapo au hawapo
- Kuimarisha ulinzi na usalama katika ziwa
- Tanganyika.

Maswali

1. Chora ramani na onesh maeneo mnyokwenda kuvuliwa
2. Mambo gani yamebadilika katika maeneo mnyokwenda kuvuliwa?
3. Tuambie mambo mazuri mnyokwenda kuhusu ziwa

Draft letter of one-page summary of research

TAFIRI Letterhead

The overall aim of the Projection of Climate Change Effects on Lake Tanganyika (CLEAT) project is to improve regional knowledge about changes in water quality and fisheries in Lake Tanganyika. This will allow Tanzania and the Lake Tanganyika Authority to develop and manage sustainable fisheries and continue studies of the effects of climate change for the future.

Specific objectives:

Build regional capacity in lake quality monitoring and sustainable management of fisheries.

- Improve our understanding of climate-driven changes in lake functioning and fisheries productivity of Lake Tanganyika.
- Gather essential data A) to develop lake ecosystem models and B) to inform local citizens, especially small-scale fishermen, of lake conditions to promote sustainable fisheries.

These objectives will be accomplished through a collaborative partnership among the following institutions and organizations:

Tanzania Fisheries Research Institute (TAFIRI)
University of Dar es Salaam, Tanzania
Aarhus University, Denmark
Illinois State University, United States

Participation and engagement of the local fisheries communities is a vital part of this project. Various opportunities for engagement and sharing of information will be available throughout the project, including workshops and individual discussions. Participation by local fishermen in the project will allow researchers to investigate fishers' local knowledge on how climate change affects livelihoods and the Lake, how fishing practices have changed in response to a changing environment, and explore the relationship between fishing practices and fish catches. This information will be combined with data on lake functioning so that a more comprehensive approach to a sustainable fishing future on Lake Tanganyika can be addressed.

If you have any questions about this project, please feel free to contact

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