Innovation Pathways out of Overfishing and Illegal Fishing in Kenya's Lake Victoria Basin

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Outline

1. Background and problem framing(s)
2. Methodology
3. Findings
   - 3.1 Focus Group Discussions (FGD)
   - 3.2 Multi-Criteria Mapping (MCM)
   - 3.3 Interviews and questionnaire
4. Synthesis and recommendations

Calestous Juma on species loss

- “In the 1950s there were more than 500 endemic …. fish species, with four endemic genera among them….. Many of the diverse species were extirpated in just a decade … *many of the drivers of species loss in Africa are unique to the continent and cannot be addressed by simply adopting lessons from other regions of the world*. Demographic transitions and urbanisation in other parts of the world have helped to significantly increase income levels and reduce pressure on natural systems. Africa’s case is exceptional.”

Juma, C. (2019) Game Over? Drivers of Biological Extinction in Africa p.214 in Dasgupta, P. Raven, P., and McIvor, A. eds., (2019) *Biological Extinction: New Perspectives*. Cambridge University Press. Emphasis is ours..

Background (1)

- Lake Victoria (LV) is the world's second largest freshwater lake. It is a resource shared by Kenya, Tanzania and Uganda, thus a transboundary resource/ecosystem…. a shoreline of roughly 3500 kms, the lake's surface covers an area of 69000 square kilometres.

- Historically, LV was home to over 500 endemic fish species, dominated by the haplochromine cichlids, many of which including the *Oreochromis variabilis* (Victoria Tilapia) are now considered endangered.

Background (2)

- Pre-1950s LV fisheries were characterized by small-scale artisanal technologies (small canoes, traditional gear and nets)….Diversity of many native fishes (catfishes, lungfish, endemic cichlids and native tilapia species).
- In 1954, the Nile perch was introduced in LV by the colonial govt. in order to reduce fishing pressure on indigenous endemic species. Due to its relatively large size, the Nile perch was expected to enhance the commercial potential of LV fisheries and serve as a sport fish.
- Accompanying the introduction of the Nile perch, was the industrialisation of fisheries based on large boats powered by outboard engines (often using trawl nets and beach seines)

Problem framing (1)

- The Nile perch turned out to be a damaging predator. By 1998, about 100 species of fish endemic to LV entered the Red Book of endangered species …. Major decline in fish population and biodiversity in LV…. Fish scarcity…. 'Big fish, small fry…"
- Intense competition for fish, changes in catchment processes, and increased fishing intensity largely due to industrial fishing…..
- Overfishing and illegal unregulated unreported (IUU) fishing increased considerably in LV in the past two decades…
- Overfishing and IUU fishing cause conflicts in the LV fisheries

Problem framing (2)

- “There … is conflict among fishers over theft and destruction of fishing gears, mainly between ‘long line’ fishers and drift net (‘tembea’) fishers. The level of insecurity in the fisheries has escalated to the point where fishers carry weapons (clubs, catapults and guns) when going fishing.” S. Heck, J. (2004): *Cross-border Fishing and Fish Trade in Lake Victoria*

Our case study is about (1)

- What are the possible plural innovation pathways out of overfishing, IUU fishing and fisheries conflicts in the Kenyan LV Basin?
- We explore three innovation pathways:

(a) Innovations (technological, institutional and social) to strengthen Monitoring, Control and Surveillance (MCS) in order to reduce IUU fishing and overfishing in the lake

(b) cage culture pathway, and (d) pond fishing farming pathway' two potential pathways to reduce pressure on inland capture fisheries

Our case study is about (2)

- We explore whether and how the three innovation pathways can be steered to achieve SDG14.4 (effective regulation of overfishing and IUU fishing) and SDG16 (peace, justice and strong institutions) in the Kenyan LV Basin
- Aim at informing the revision and implementation of Kenya's national policies for STI, fisheries (biodiversity in general) and aquaculture.
- Aim at informing the strengthening of the National Fisheries Management and Development Act No. 35 of 2016

Methodology

- Literature review to identify key issues in and causes of overfishing, IUU fishing and fisheries conflicts; map actors, etc and inform design of questionnaire
- Focus Group Discussions (FGDs)– 27 August 2020 at Marenga Beach, Port Victoria and 10 September 2020 at Bumbe Beach, Samia
- Questionnaire and interviews (January-June 2021)
- Multi-criteria Mapping (MCM) workshop and interviews (April 2021)

From the literature review

- Globally, problems of overfishing, IUU fishing and conflicts in inland fisheries are complex. They have no technological fixes.
- There is a huge body of scientific knowledge and a wide range of technologies that can be deployed BUT weak social institutions and in general weak governance structures to spur sustainability in inland capture fisheries.
- Plural pathways (combinations of STIs, mixes of policies and regulations, or mixes of technologies, institutions, policies and regulations) are needed to address overfishing, IUU fishing and related conflicts.

From the literature review (2)

- Yet, current approaches to addressing overfishing, IUU fishing and conflicts in LV tend to be simplistic and deterministic…
- Dominant approaches to addressing overfishing, IUU fishing and conflicts in LV are largely Monitoring, Control and Surveillance (MCS), regulatory…policing and institutionally fragmented ….
- They are not adequately informed by adequate understanding of the complexity of economic, social and ecological problems/issues of LV.

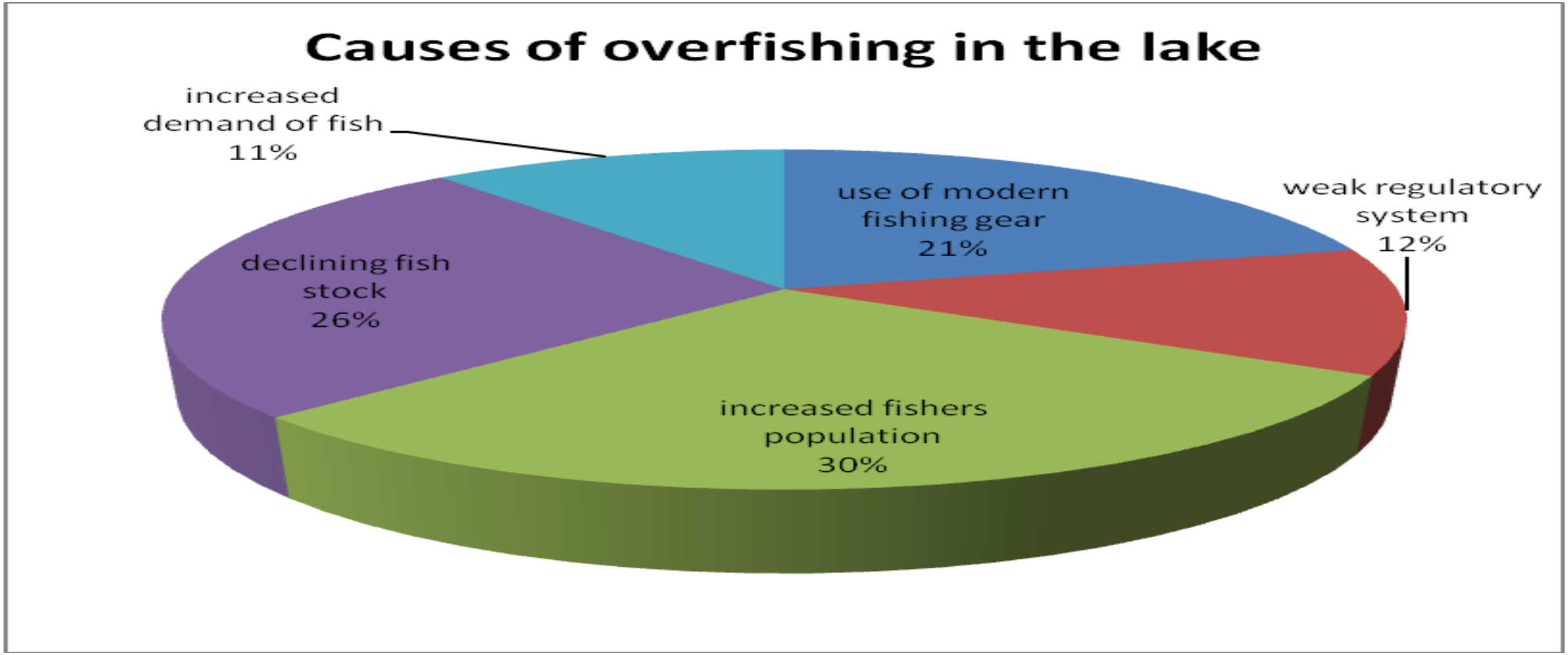
Who are the actors in LV fisheries

- Fishers
- Individual fish farmer entrepreneurs
- Women and youth groups
- Public universities engaged in scientific research
- Regulatory bodies.
- Research institutes.
- International bodies-donor organisations

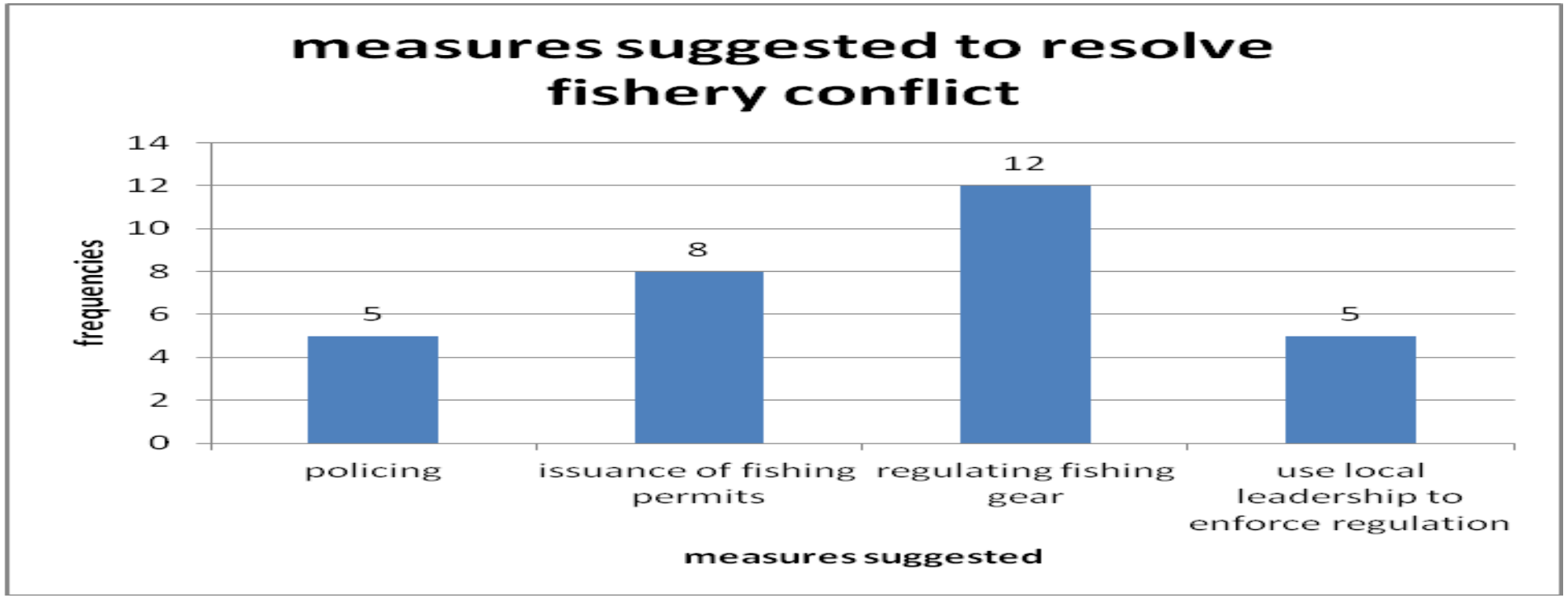
Findings/issues from FGDs

- Majority 68.8% of participants at FGDs agreed that overfishing and IUU fishing exist in LVB, while the remaining 31.2% disagreed that there is overfishing/IUU fishing in the LVB.
- **Causes** attributed to overfishing and IUU fishing as well as conflicts include:
  - decline of fish stock.
  - use of illegal fish gear.
  - increased fishers population.
  - Technological development

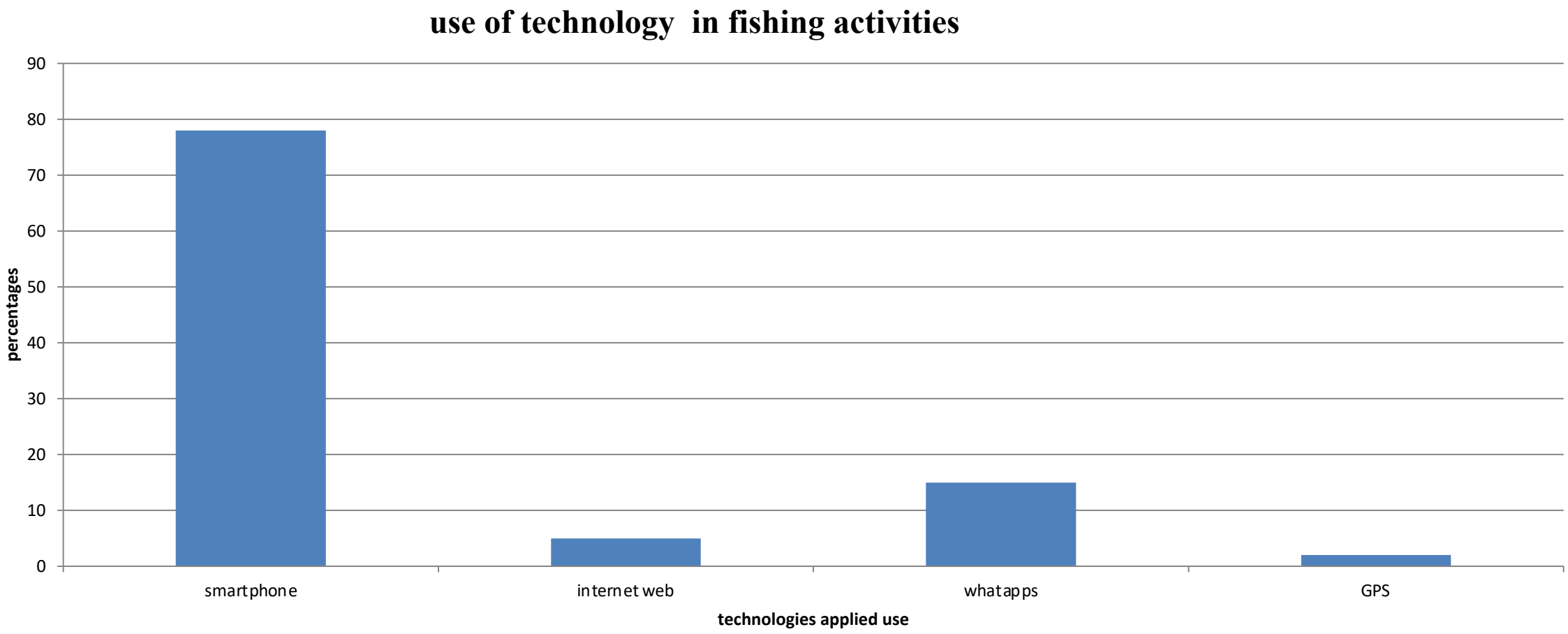
Causes of overfishing and IUU fishing



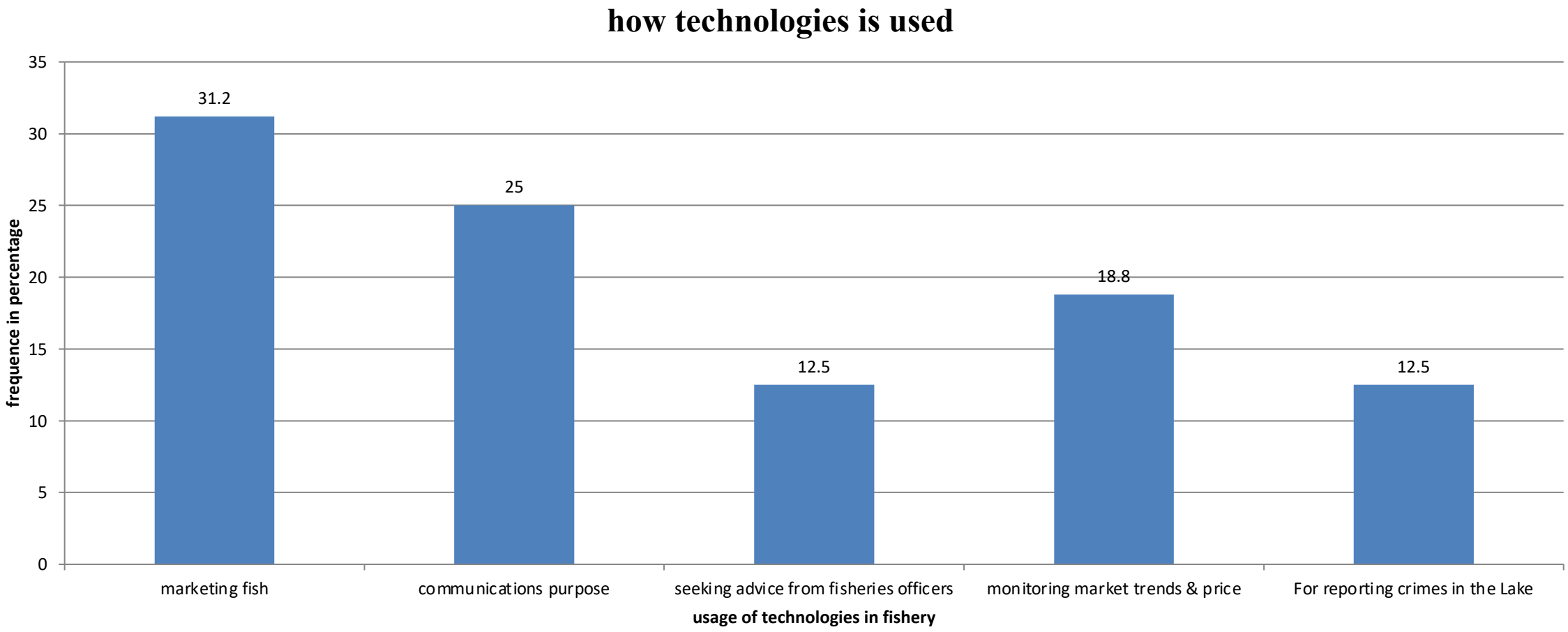
FGDs suggestions on resolution of conflicts



Common technologies applied



How technologies are applied



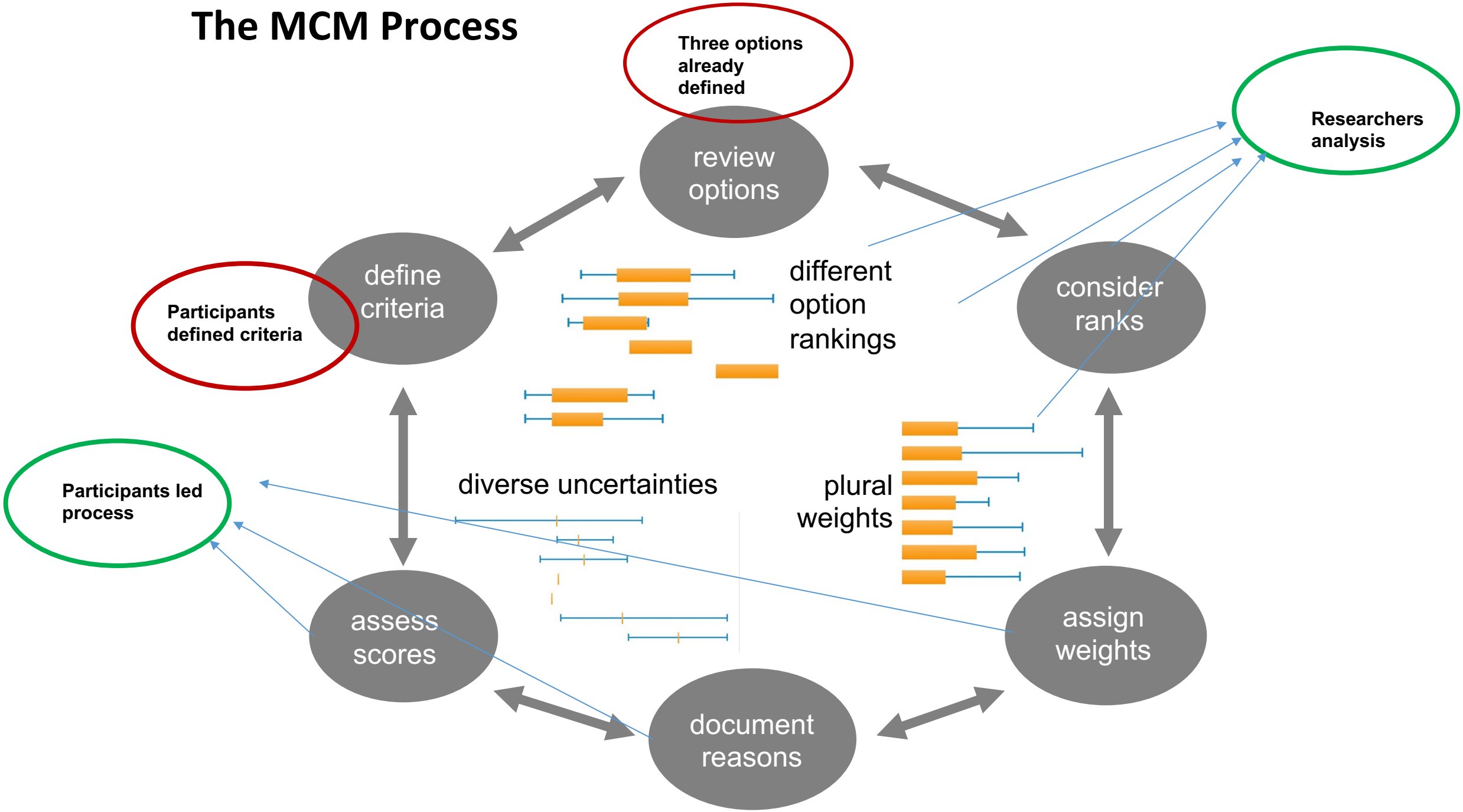
Mapping the 3 Pathways

Pathway	Indicative STIs involved	Key Actors	Governance Mechanisms/Issues
MCS (Regulatory) Pathway	Smartphones, drones (aerial vehicles providing data on fishing vessels and fishing activities in real time), Sonar and GPS enabled buoys	Beach Management Units (BMUs), Kenya Marine Guard (KMG), Kenya Police Services (KPS), Kenya Fisheries and Marine Research Institute (KFMRI)	Fisheries Act 2016; Criminal Laws of Kenya; Anti-Corruption Laws and Courts, corruption/bribes, weak enforcement capacity of KMG and KPS
Cage Culture/Fishing	floating cage technology; Cage mesh of different sizes; fish genomics for breeding and gene enhancement	Catholic Church Women Groups, County governments (Busia and Kisumu), European Union (EU), IFAD, UN FAO, World Bank, fishers, private companies, Lake Victoria Basin Development Authority (LVBDA), national public universities, KFMRI, KFS, EIA Authorities and Courts	National Environment Management Act; Fisheries Act 2016 (covering cages established in the lake and public rivers); corruption and politicization of award of licenses
Pond Culture/Fishing	Earth and linen ponds Hydroponic techniques; genomics for fish breeding Fish polyculture practices, feed production techniques (e.g. manure)	Private individuals or families, schools and a few private companies, women cooperative groups, KFS	National Environment Management Act (EIA provisions); land tenure laws (access to and ownership) issues affecting mainly women farmers and farmers without title deeds

Multicriteria Mapping (MCM)

- Hybrid quantitative / qualitative method, linking less tangible qualitative conditions with generally more visible quantitative assessments
- Broadens out' scope of appraisal beyond usual confines
- 'Opens up' a picture of 'plural and conditional' patterns-Retains a concrete focus on practical options for action
- 'open up' a map of different views and rigorously explore how 'answers' depend on different 'framings' of questions (not 'closing down' to a single view)
- It is for evenly illuminating the pros and cons of alternative pathways, not focusing on just a single one

The MCM Process



MCM workshop in Ugunja

Aquaculturalists

Development authorities such as Aquarech

Female: 2
Male: 5

Local community

Local fish farmers, fish traders, Religious institutions and leaders of local agencies, Lake Basin Development Authority

Female:3
Male: 6

Academics

Researchers

Male : 2

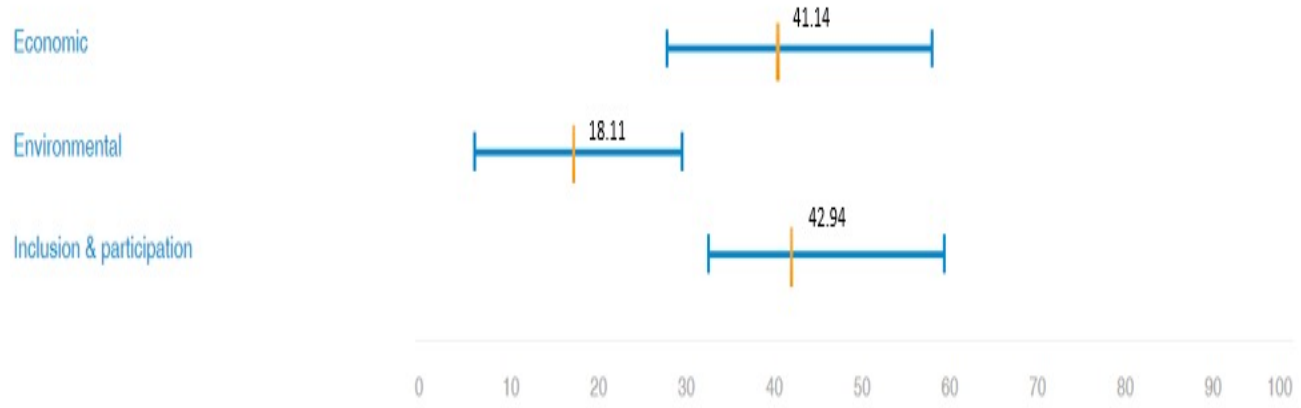
Local government reps

Coast guards, head of enforcement unit, local development authority

Male: 4

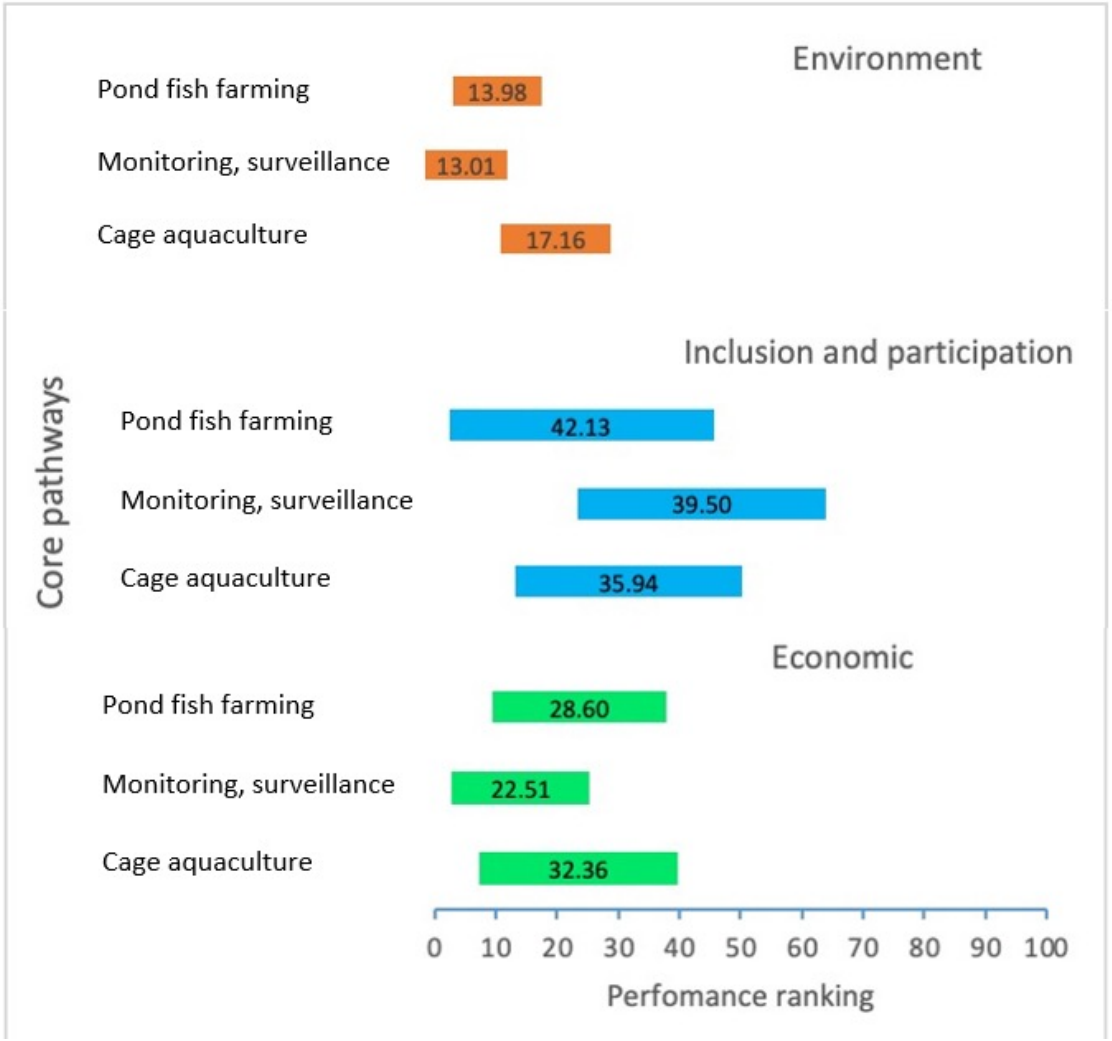
The Results

Criteria grouping



1. *Social inclusion and participation*, related to the interests and voices of marginalised stakeholders (SDGs 10, 12 and 16)
2. *Economy* related to the costs associated with technologies, technical standards labour demand and economic benefits (SDGs 1, 8, and 12)
3. E*nvironment*, related to Lake Victoria's ecological condition and preventing extinction of fish species (SDGs 14 and 3).

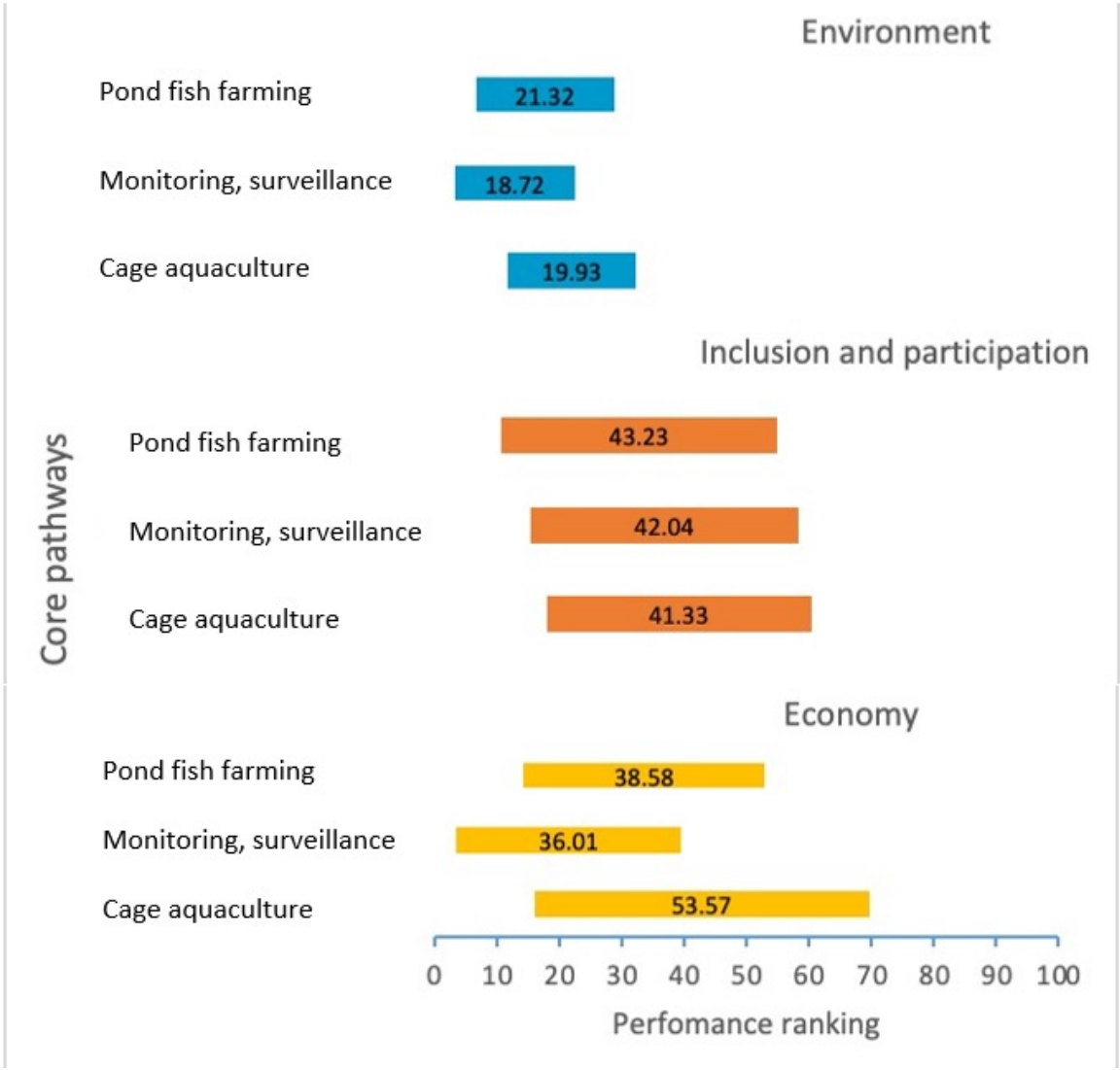
Appraisal of the pathways by different stakeholders: Researchers



Monitoring, control and surveillance (MCS) pathway performing worse than the other two pathways

"[MCS] lacks appropriate resource allocation by county and national governments and even when they do so, there is lack of stakeholder contribution to their work."

Aquaculturalist



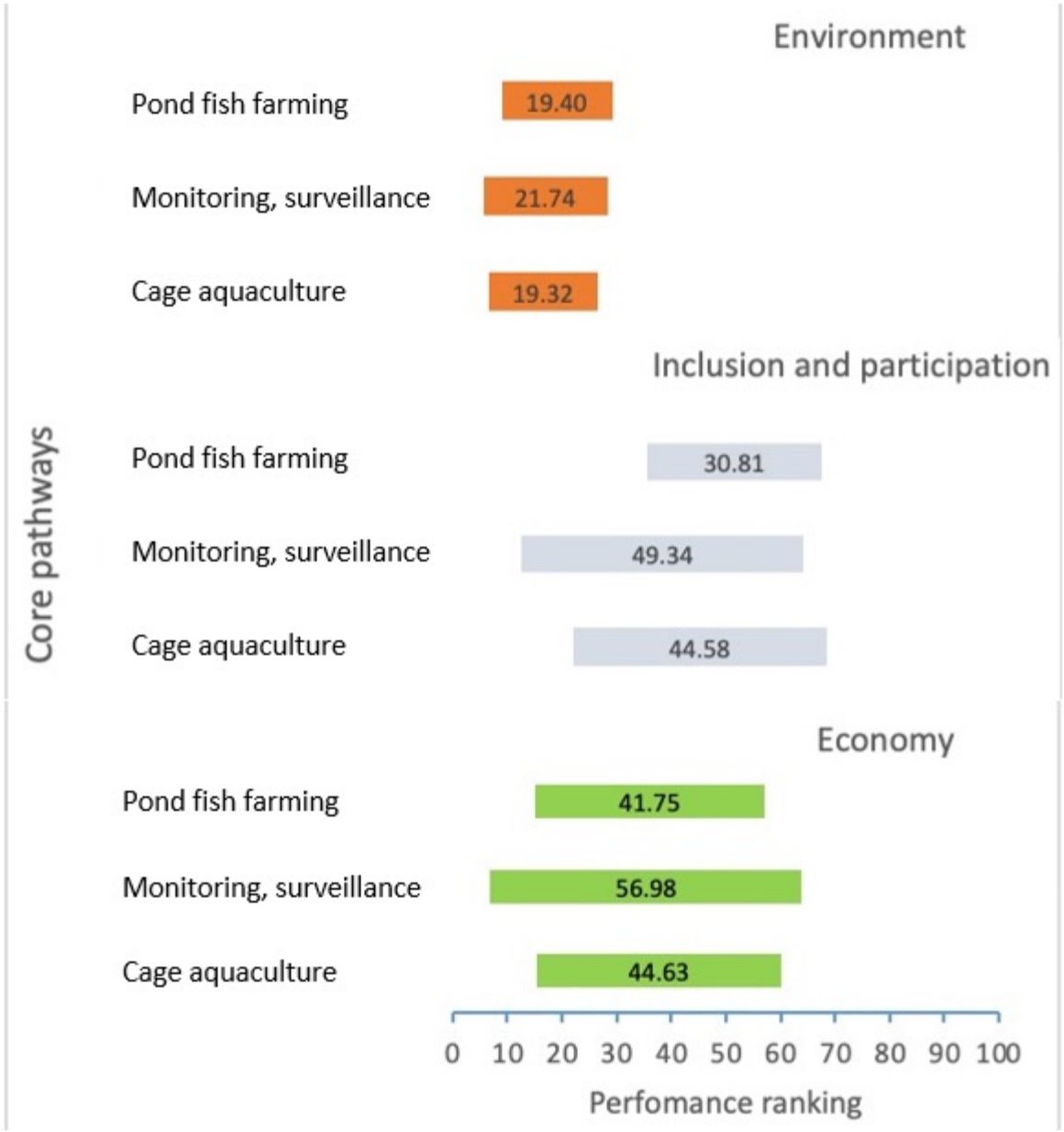
- Economy issue, MCS rated lowest. Seen as a vehicle for advancing corruption.

- Economic issue; cage culture preforms better

"*Assume I have multiple cages and harvest at various intervals, I will be economically secure throughout the year. I will therefore have zero need to conflict with my colleagues.*"

- Environment issue, aquaculture pathways (pond and cage) appraised as somewhat better performing than MCS

Local Community



- *Inclusion and participation*

-pond culture score is associated with a lower uncertainty than the other two pathways.

-High uncertainty associated with the MCS pathway.

"Community is not fully engaged in the process of setting up systems and enforcement of the policies."

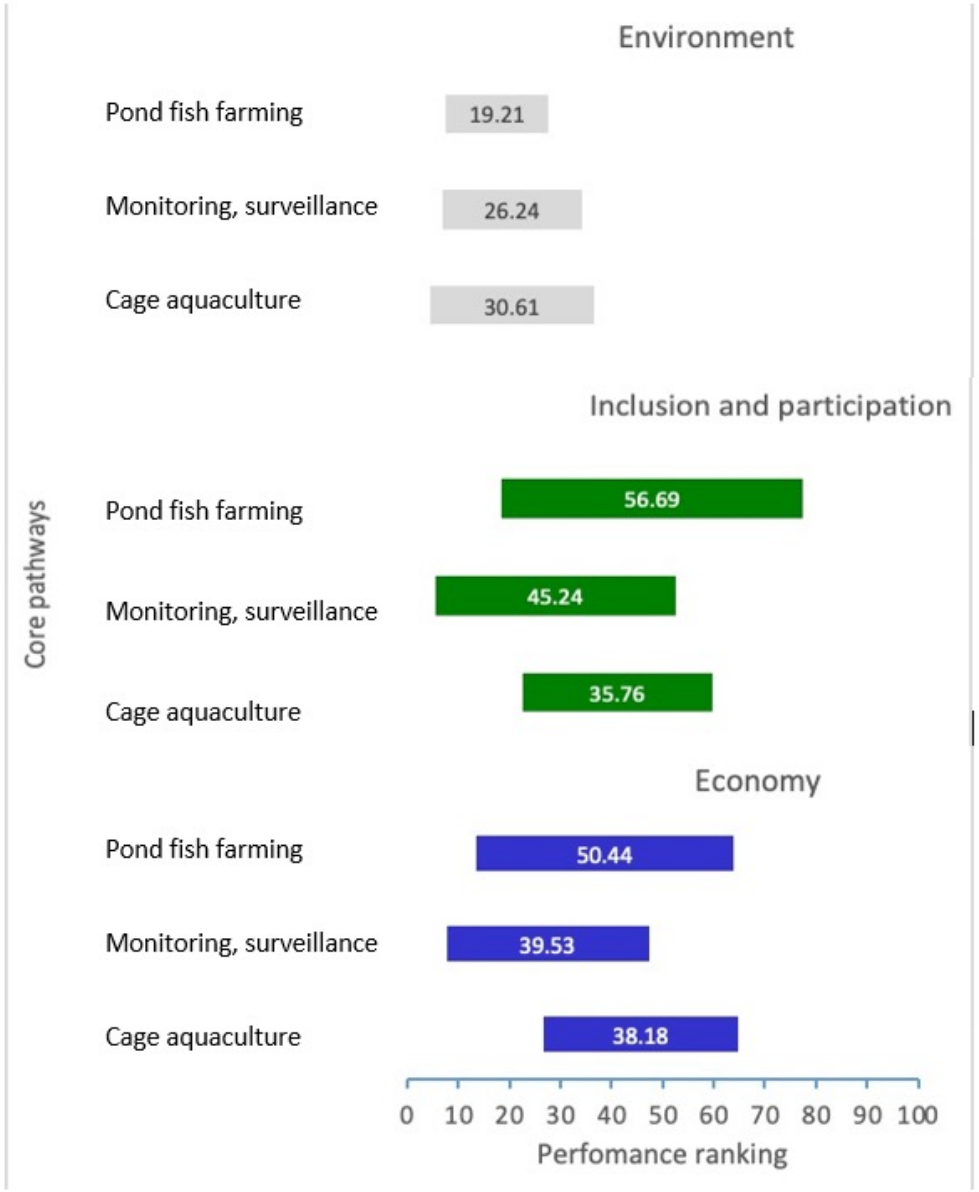
Economy issue

-MCS pathway as the best performing

-Low scores for pond as quality of the fish deemed inferior

"Size of fish and quality is small and not preferred in the market." **Trader**

Local and national government



Economy issue
-MCS may curb illegal fishing, increasing size and quality of fish capture, fetching higher prices (optimistic scenario)

Ponds may support increased production but constrained by availability of land and fish feeds (pessimistic scenario)

What our analysis reveal

- Analysis reveals the complexities associated with addressing challenges of IUUF and overfishing and the interdependent nature of the options
- Plural conditions, voices regarding the options based on the criteria.
- While pathways might be highly uncertain, they are dependent on the inherent assumptions of the various perspectives/voices from stakeholders
- Plurality and conditionality of pathways emphasises policy processes to support multiple diverse pathways

Findings from questionnaire & interviews

- Monitoring, Control and Surveillance (MCS) in LV is characterized by reliance on a very narrow range of range technologies, weak regulatory governance, weak institutional coordination (particularly between BMUs and the Kenya Coast Guard), corruption and political interference…
- At least 65% of interviewees and respondents to the questionnaire do not consider it an efficient or adequate pathway out of overfishing and IUU fishing.
- Pond fish farming is considered by majority interviewees and respondents (80%) as a pathway with/of high potential to reduce fishing pressure of inland capture fisheries. Increasing number of local income households and women (and women groups) entering the pond fishing pathway.

Findings from questionnaire & interviews

- Major challenges in pond fishing farming are frequent floods, scarcity of quality fingerlings and fish feed, weak extension services from KFS (to help address veterinary issues), and ambiguous land tenure regimes. Pond fish farming is based on old technologies, less integrated in/with other economies activities in the region.
- Cage fish farming is the dominant aquaculture pathway, and considered by at least 80% of respondents to have high potential of reducing overfishing and IUU fishing as it attracting fishers from inland capture fisheries. However, costs of entry are relatively high for low income fishers. It is increasingly controlled by politicians and persons with connections to the county governments…

Fish farming pathways: advantages and disadvantages

Pathway	Advantages/opportunities	Disadvantages/challenges
Cage culture/fishing	• A rich body of traditional local knowledge of cage culture makes it possible for many households to gain entry into this form of fish production • Cages can be moved to different locations in the water body and thus less prone to problems of flooding and theft that are experienced with ponds • Cage culture or fishing is preferred by fishers and local people in general because of flexibility and ability to utilize many types of water resources or systems e.g. rivers, reservoirs and the lake; • Cage culture (compared to pond fishing) supports high stocking densities while at the same time preventing a build-up of waste instead the cage • High employment opportunities particularly for male youth	• Potential risk of transfer of fish diseases from cages to natural populations in rivers and the lake • Pollution of surround water bodies leading to deterioration in the health of fisheries ecosystem • Due to the rich protein diets fed to caged fish, the surrounding water might have a high nutrient load due to uneaten feed, faecal waste and excreta from cage fish affecting the health of inland capture fisheries • Possibility of genetic contamination arising from cage fish escaping and being into interactions with wild inland capture fish in the lake and/or rivers • High costs of feed and fingerlings
Pond culture/fishing	• Accumulated local knowledge and relative easy access to materials for construction earth ponds • Potential entry by women (particularly women groups) is high compared to cage and inland capture • High potential for small-scale fish farming • Availability of credit facilities (microfinance) for women and youth groups	• Frequent flooding in LV Basin destroy farms • Poor quality and scarcity of water • Disease outbreaks and poor extension services • Land tenure is poorly defined in the region • Predators (wild animals) • High costs and scarcity of feed and fingerlings • Pollution of soil and water systems

Overall, emerging issues

- MCS and fish farming (cage and pond) can evolve with potential to be *a mix of complimentary pathways to* SDG16, SDG 14 and contributing also to SDGs 2, 5 and 8
- The MCS pathway needs to accompanied by strengthening of institutions, *address issues of corruption and enforcement, enhance involvement of BMUs and local communities*
- Potential of cage and pond fishing as pathways to SDG16 depends on mobilizing and strengthening social institutions e.g. women groups and cooperatives
- No evidence that current R&D initiatives (by KEMFRI and universities) and extension services are aligned, and are capable to supporting fish farming to reduce pressure off inland capture fisheries..

Recommendations (1)

- MCM, pond fishing and cage fishing should be 'deliberately steered' as pathways to SDG14 and SDG16 (with potential for SDG2, SDG5 and SDG8) through a holistic innovation policy framework, with 'policy mixes (and policy instruments) that encompass social, economic and ecological sustainability goals. Single (standalone) policies and/or policy frameworks will not deliver…
- Reconfiguration of current institutional arrangements to ensure and enhance robust articulation/synergies (e.g. between BMUs and KFS, private and public sectors) is need to establish a dynamic locally embedded Innovation System (IS), helping to create local sustainable fish production value chains.

Recommendations (2)

- Strengthen governance instruments and structures, particularly in MCS and cage fish farming pathways, by enhancing the involvement of local people in policy design and programme implementation. National top-down policies, plan and programmes do not deliver innovation at local levels. Locally designed and embedded innovation policy and regulations needed.
- Invest in the use of county and national public procurement frameworks to prospect, procure and introduce modern aquaculture technologies and build capacity of local institutions to adapt and deploy modern technologies… in local social conditions

Thank you!!