

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE



2nd International Conference on
AQUATIC RESOURCES OF KENYA (ARK II):
Aquatic Research for Development
16th – 19th November 2010, Naivasha, Kenya
CONFERENCE REPORT



Co-Hosts



Partners



University of
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1 Acknowledgements

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Dr. Kazungu, Johnson Michael (PhD, MBS)
DIRECTOR, KMFRI

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3 Executive Summary

The 2nd International Conference on Aquatic Resources of Kenya (ARK II) was held against a backdrop of national, regional and international environmental challenges as a follow-up to the First Conference (ARK I), which was held in 1981. Although aquatic resources contribute enormously to Kenya's national economy, their overexploitation, effects of pollution, urban development and more recently global climate change have exerted unprecedented pressure on these resources thus compromising their capacity to provide inherent ecosystem goods and services. ARK II was thus strategically held in Naivasha Town so as to profile the environmental challenges facing Lake Naivasha ranging from receding water levels, pollution, catchment degradation and urbanization among others.

The overall theme of this Conference was *Aquatic Research for Development*. It covered 7 thematic areas namely: Aquaculture Research and Development, Biodiversity and Ecosystem Functions, Limnology and Oceanography, Climate Change, Contemporary Socio-economic Issues, and Policy and Management. The Conference had high level representation from various local and international partners, including; policy makers, resource managers, the scientific community, civil society and the private sector besides various renown national, regional and international keynote speakers. Cumulatively, 83 oral and 35 poster papers were presented during the four days of the Conference.

The major highlight of the Conference was a special Roundtable Session dedicated to L. Naivasha which provided a forum for stakeholders to deliberate on various challenges facing the lake ecosystem with a view to proposing immediate and short-term mitigation measures aimed at restoring the lake's ecological integrity. As a major output of the Roundtable discussions, the Lake Naivasha Basin Management and Technical Committee was formed to facilitate an integrated approach in managing the lake and associated ecosystems. This Committee will link up with the Inter-Ministerial Committee on L. Naivasha spearheaded by the Office of the Prime Minister.

In recognition of the emerging global carbon market, a special session on mangrove REDD (Reduced Emissions from Deforestation and Degradation) was convened. This Special Session entitled *Mikoko Pamoja* explored the opportunity of including mangrove forests in carbon offset projects. The participants discussed whether replanting mangroves and using them sustainably could enable the local communities dependent on mangroves ecosystem services (ES) to access the global carbon market, thereby earning an income for investment in education, health and conservation.

4 Opening Ceremony

ARK II Conference was held in Kenya's Rift Valley town of Naivasha from 16th to 19th November, 2010. It was organized by KMFRI and co-hosted by the Kenya Wildlife Service Training Institute (KWISTI). Financial support was received from the Western Indian Ocean

Marine Association (WIOMSA), NERC of UK through the *Mikoko Pamoja* Project, Kenya Commercial Bank, Oserian Flower Company of Naivasha, and the Lake Naivasha Riparian Association.

The Conference was the second of its kind to be organized by KMFRI since the last one, ARK I, held in Mombasa in July 1981. More than 250 participants attended the meeting, including; government agencies, NGO's, Academia, the Private Sector, national and international organizations and the media.

ARK II aimed at sharing experiences in advances made over the last two decades in aquatic research in Kenya; especially those related to management of critical habitats, fisheries resource management and aquaculture development in line with government policies and global development strategies on food security, job creation and poverty alleviation. The main objective of ARK I was to review the status of data and information collected in the aquatic systems of Kenya over the previous decades.

The Conference opened on 16th November, 2010 at the KWSTI Plenary Hall. In his opening remarks, the Chairman of the National Organizing Committee (NOC), who is also the Deputy Director of KMFRI in charge of inland waters, Dr. Enock Ombunya Wakwabi welcomed all the participants and outlined the aim and objectives of the conference before welcoming the Director of KMFRI, Dr. Johnson Michael Kazungu.

Dr. Kazungu welcomed participants, and congratulated the NOC for the excellent planning and preparation that led to the successful hosting of ARK II. The list of NOC members is appended in Annex XI. The Director pointed out that Kenya is endowed with a wide diversity of aquatic ecosystems, both marine and fresh water. These ecosystems provide enormous aquatic resources which sustain livelihoods and contribute immensely to the national economy. He informed the participants that Kenya's aquatic resources are currently experiencing degradation and outright destruction through anthropogenic and natural induced threats and called for an integrated approach to their management. The full text of his speech is contained in Annex I.

Additional welcome remarks and greetings prior to the official opening by the Guest of Honour were read out by Prof Penina Aloo-Obudho, the host of the Conference and Chair of the KMFRI Board of Management, Prof George Otianga-Owiti, the Co-host of the event and Principal of KWSTI, the District Commissioner of Naivasha and His Worship the Mayor of Naivasha. In her speech, Prof. Aloo-Obudho highlighted among other issues, the strategies the KMFRI Board has embarked on with a view to improving service delivery and for meeting the challenges arising from the changing socio-economic environment. Full text of her speech is in Annex II.

The Permanent Secretary in the Ministry of Fisheries Development Prof. Micheni Japeth Ntiba welcomed the participants on behalf of the Ministry and invited the Guest of Honour to deliver the Opening Speech. Prof. Ntiba observed that once the National Oceans and Fisheries Policy was launched in 2008, the march to restructure the fisheries sector started in earnest. The policy

recognizes the leadership role research, science and innovative technological must play towards achieving the sectoral objectives enshrined in the tenets of the Kenya Vision 2030. The full speech of the PS is in Annex III.

The Minister for Fisheries Development Hon. Dr. Amerson Jeffah Kingi was the Guest of Honour for the event. In his speech, the Minister reiterated the Kenya Government commitment to improving the nation's fishery sector. The Minister informed the participants that it is in recognition of the importance of this sector in Kenya's economy that a fully fledged Ministry of Fisheries Development was established. Dr. Kingi explained why the Ministry is a critically strategic Ministry with the potential to turn round the living standards of the Kenyan people right from the grassroots and improve the household income. The Hon. Minister pointed out that during the 2009/10 Financial Year, the Ministry was allocated 1.2 billion Kenya Shillings for national Aquaculture development under the Economic Stimulus Programme (ESP), which has now almost doubled to 2.2 billion in the current Financial Year. The full text of the speech is in Annex IV.

5 Conference Programme

The Programme of the Conference comprised oral presentations, posters, exhibitions and special sessions. Outline of the programme is presented in Annex V and the list of session Chairs and Rapporteurs in Annex X. On Day 1, an exhibition was held to display the services and products that KMFRI provides, as well as those of its affiliate projects, programmes and research partners. On display were tools of aquaculture technology and fishing gears used and/or developed by the Institute, activities of the Western Indian Ocean Marine Science Association (WIOMSA), the Agulhas Somali Current Large Marine Ecosystems (ASCLME) programme, South Western Indian Ocean Fisheries Programme (SWIOFP), Ocean Data and Information Network for Africa (ODINAFRICA) Programme and other regional and international initiatives based at KMFRI.

On Day 2 of the Conference, a Roundtable session was convened to discuss and deliberate on the issues and challenges facing Lake Naivasha. The Roundtable discussion culminated in a communiqué detailing remedial measures on Lake Naivasha including the establishment of the Lake Naivasha Environment Management and Technical Committee to advise on the management of L. Naivasha and associated ecosystem. Full details of the Communiqué are in Annex VI. To tap into the global carbon funds, a special session on mangroves addressing reduced emissions from decreased deforestation and forest degradation (REDD) was held. This session, entitled *Mikoko Pamoja*, highlighted incentives based mechanism of Payment of Ecosystem Services (PES) particularly carbon trading.

5.1 Themes and presentation

ARK II received more than 250 applications for consideration for either oral or poster presentation. After a review of the applications, in line with conference theme, only 83 oral

presentations and 35 posters were invited. Fig. 1 shows the number of oral papers and poster presentations in each theme. The complete list of participants is presented in Annex VII.

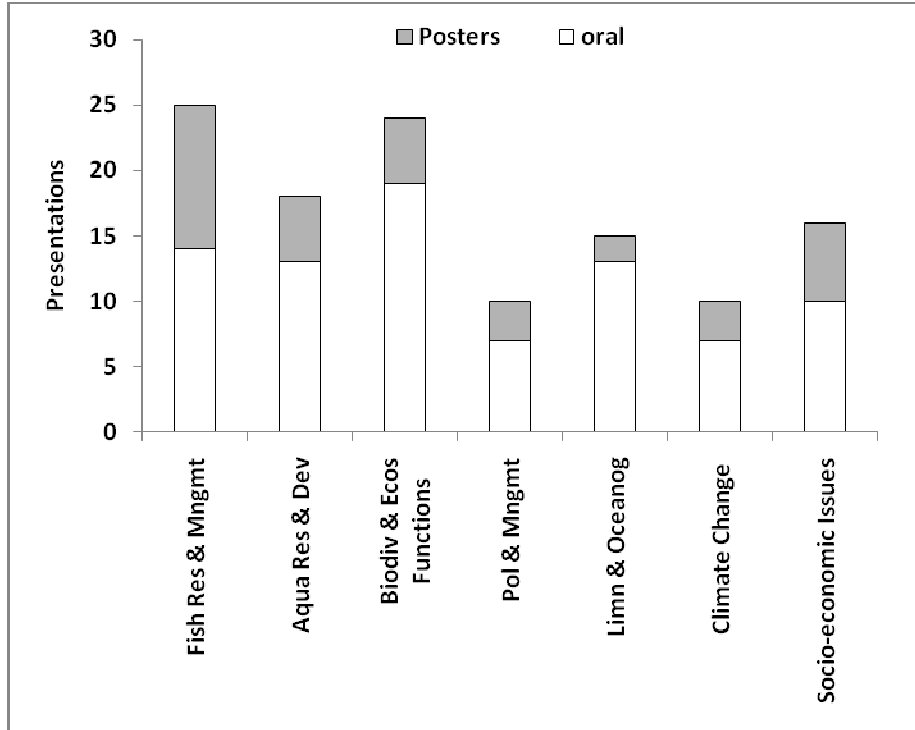


Fig. 1: Number of oral papers and posters presented under various themes presented a the conference

The theme on biodiversity and ecosystem function had the most oral presentations while climate change and policy and management had the least. Most of the poster presentations were on the thematic area of fisheries research and management. Limnology and oceanography had the least poster presentations.

Majority of the oral presentations were from local participants (KMFRI-65, Universities-10, Others-8). Most of the posters were also from the local participants (KMFRI-23, Universities-4, Others-3). There were also presentations from participants outside of Kenya (Netherlands, Mozambique).

5.2 Keynote Presentations

Each day of the Conference, the scientific programme was preceded by two keynote presentations. A total of 8 Keynote presentations covering all the themes of the Conference were offered by various national, regional and international experts. The following are excerpts of the keynote presentations.

5.2.1 Recent Theoretical Development on the Fishing Patterns and Management of Small – Scale Fisheries

Prof. Jeppe Kolding, University of Bergen, Norway

This presentation highlighted selective fishing in relation to fisheries and ecosystem sustainability. Prof. Kolding explored the historical background of fisheries management and highlighted the issues of fisheries in the developing countries as common property with open access. He indicated that small scale fisheries in developing countries function as a social security system and this poses challenges for management. He indicated that when management projects are set up and implemented, the theoretical background of the proposed management regimes are anchored on old western management theories. Prof. Kolding emphasized that fisheries models in use only consider internal factors such as predation, competition and fishing styles and an assumption is made that we can influence fisheries by managing these factors. However, such systems also adapt to external drivers such as climate, rainfall, nutrients etc, which are hard to manage and this leads to complicates the management actions.

In the case of small scale fisheries, where little or nothing is known, management regulations are based on regulating catchability in terms of selectivity based on mesh size, capture size, gear regulations and closed areas/seasons. This leads to the uptake of targeted fish species and size selection which in turn leads to a change in age and size structure of the fishery resulting in younger and smaller individuals as the larger mature fish are taken up from the fishery. He indicated that recent research shows that fishing effort in small-scale fisheries is regulated by fluctuating natural production from highly resilient fish communities. By using a wide range of highly adaptive fishing methods, each of which selects specific sections of a fish community; an overall unselective fishing pattern may arise which harvests all components according to their relative abundance. According to Prof. Kolding, such unregulated, non-selective, adaptive fishing patterns appear far more ecosystem conserving than current single species management approaches

5.2.2 Aquaculture Research and Development: Is there a roadmap from Subsistence to Sustainable Aquaculture in Kenya?

Prof. Charles Ngugi, Kenyatta University, Kenya.

Prof. Ngugi inspired the participants by his effort to show that Africa is ready for an *Aquaplosion*. He indicated that the consumer demand for fish has increased globally and that aquaculture continues to grow at a rate of approximately 8% per year. He indicated that historically, fish farming in Kenya began in 1940 when farmers in Central and Western Kenya started to construct fish ponds to culture Nile Tilapia (*Oreochromis niloticus*) and African catfish (*Clarias gariepinus*). He showed the growth in the demand for fish in Kenya and indicated that apart from meeting the need for food and protein this sector enhances opportunities for job creation. Considering the number of secondary school students that do not get opportunities to

proceed to university, aquaculture can be instrumental in contributing jobs in the Kenyan economy. Prof. Ngugi highlighted that factors that limit fish production include low technical support and extension, poor understanding of markets and the lack of understanding of the value chain system. He emphasized the need to view aquaculture as a business and the need to focus on the sustainability of such ventures.

5.2.3 Lake Naivasha - Can anybody manage nature's uncertainty?

Dr. David Harper, Leicester University, United Kingdom

The talk by Dr. Harper focused on the natural state of Lake Naivasha. Its water level changes and its ecology, the management of the lake in the 20th century and the most recent changes that have taken place in this ecosystem over the past five years. He highlighted the fact that many scientific studies were undertaken up to the 1980's. Towards the end of this period, the lake began to deteriorate due to invasive plants and pressure from the growing population around it. Dr. Harper elaborated on the geology of the area, the fluctuations in the water content of the Lake, fish introductions from the 1920's, post-independence research activities, water abstraction, and crayfish introductions in 1970 as well as plant invasions. Dr. Harper highlighted the consequences of the species introductions to the system and the fluctuating nature of the changes to the Lake ecosystem. He stressed the role that the papyrus zone played as a sediment trap and emphasized the need for the restoration of this riparian edge. From the studies undertaken in this ecosystem, he indicated that the natural recovery processes of the lake have been destroyed.

Dr. Harper also, on a light touch, indicated that currently there are more management plans for Lake Naivasha than there are species in the Lake and there is need for a change in the way the Lake is used before it is too late. He stressed that the only hope for restoration is through participatory implementation of the existing management plan (one agreed upon) by all. Each person around this lake needs to feel a common 'ownership' of the lake which is accompanied by a care about its health.

5.2.4 There is no Wealth but Life: Biodiversity, Ecosystem Services and the Poor

Dr. Mark Huxham, Edinburgh Napier University, United Kingdom

Ecosystem services are the basis of human welfare existence and Dr. Huxham's presentation aimed at exploring the value of ecosystems to human existence. He indicated that wild organisms form an important component of ecosystems and are essential for the maintenance of ecosystem services, but the relationships between these and biodiversity are complex. His talk presented an overview of the latest evidence showing the importance of biodiversity to ecosystem service provision and provided key findings of relevance to policy development with emphasis on aquatic systems. He indicated that although all humans are ultimately dependent on ecosystems, the economically-disadvantaged often have an immediate relationship with natural ecosystems for their daily needs that is not shared by the wealthy. They also act as custodians and managers

of ecosystems that have regional and global importance, but do not receive rewards proportional to the importance of this task. His talk explored new ways in which ecosystem values can be recognized (such as ‘payments for ecosystem services’) in which the values of these ecosystems might be recognized and local people might be rewarded for the sustainable management of biodiversity. He emphasized the need to consider payment of ecosystem services as it is the key to the production and restoration of ecosystems.

He concluded his presentation by giving highlights on some of the collaborative projects between Universities in the UK and KMFRI, on ecosystem services of mangrove noting that whereas they were in their early stages, earlier results indicated significant dependence on mangrove ecosystem goods and service by the local communities and thus the need to conserve these resources

5.2.5 Linking Science to Management: The Case of Managing Marine Ecosystems in East Africa

Dr. Nyawira Muthiga, Wetlands Conservation Society, Kenya

The presentation by Dr. Muthiga highlighted the opportunities for management in the East African coastal region. She demonstrated how anthropogenic pressures including overfishing and climate change threaten coastal resources. The management regimes of these resources were highlighted in her talk and she showed how findings from MPA studies have been used to guide management regimes in the Western Indian Ocean region (WIO), including Kenya. She showed that in coral reef areas the top-down national management was most effective in no-take closures while gear management worked best when implemented at the local level with communities. She shared findings from work done in the WIO region that show that communities are able to transform and adapt social-ecological systems that enable them to reduce dependence on natural resources.

The level at which scientific information is generated in studies of the coastal and marine environment in Kenya was also elaborated in the presentation by showing publication trends in different fields. Gaps in microbiological studies and natural products were noted as well as in critical habitats such as seagrasses. Dr. Nyawira placed emphasis on the need to generate information in some of these areas as this would assist in the development of management regimes that work to protect these areas.

5.2.6 Climate Change: Impacts and Opportunities

Prof. Laban Ogallo, University of Nairobi, Kenya

Prof. Laban Ogallo’s presentation was delivered by Dr. Gilbert Ouma. He indicated that the Greater Horn of Africa (GHA) is prone to extreme climate events such as droughts and floods with severe negative impacts on key socio-economic sectors of all the countries in the sub-region. He provided a brief history of the development of the Intergovernmental Authority on

Development (IGAD) which started in 1989, as a Drought Monitoring Centre with its headquarters in Nairobi (DMCN) and a sub centre in Harare (DMCH) which were established in response to the devastating weather related disasters. Later in 2003, DMCN evolved to become the Intergovernmental Authority on Development (IGAD).

Its name was then changed to IGAD Climate Prediction and Applications Centre (ICPAC) in order to better reflect all its mandates, mission and objectives within the IGAD system. The centre is responsible for seven IGAD member countries namely: Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda as well as Burundi, Rwanda and Tanzania. This centre produces regular climate/weather bulletins, climate watch and climate change scenarios. Dr. Ouma indicated that the profile of climate change has risen from being an environmental issue to a major development issue and it is currently seen as the 'biggest threat facing the world'

Climate poses a huge threat to the attainment of the Millennium Development Goals, especially in Africa where increased temperature and changes in precipitation reduces agricultural productivity and natural resources. Changes in precipitation and run-off leads to greater water stress while changes in temperature affect the distribution of water and vegetation. All these things lead to reduced productivity and reduced livelihood security of the poor.

Dr. Ouma further stressed that coastal zones are particularly vulnerable to climate variability and change and key concerns include sea level rise, land loss, changes in maritime storms and flooding and coral bleaching. The threat of climate change has given an opportunity to researchers to study the atmospheric system and emphasis should be given to multidisciplinary approaches to research. In order to enhancing synergies between researchers from different disciplines, he stressed the need to build networks of regional scientists to undertake work in climate change.

5.2.7 Policy and Management - Science for development

Prof. Shaukat Abdulrazak, National Council for Science and Technology, Kenya

Mr. Said S. Hussein delivered the presentation on behalf of Prof. Abdulrazak. He provided highlights of the development and application of science, technology and innovation in Kenya through the National Council for Science and Technology (NCST). He emphasized that science and technology are the essential means by which the development of nations has been facilitated and that for Kenya to achieve Vision 2030 there is a critical need for the adoption of scientific and technological advances.

Further, he highlighted that the achievements the NCST can be credited with including developing the directory of scientists, technicians and artisans in Kenya and also elaborated on the efforts of the council to equip laboratories in the country with critical scientific equipment to enable them function.

Lastly, Mr. Hussein stressed that in order for the country's development agenda to benefit from the scientific and technological innovations, an institutional framework with legal powers and capacity to develop, collect and make available information on scientific and technological advancements to users is essential.

5.2.8 Development of Capacity in Marine Science in the region in the last two decades

Dr. Julius Francis, Western Indian Ocean Marine Science Association, Zanzibar, Tanzania

Dr. Francis highlighted different aspects of capacity building undertaken by the Western Indian Ocean Marine Science Association (WIOMSA). He indicated that from the late 1980's the number of marine scientists have increased in the region and there is capacity in different disciplines. He indicated that over time there has been over training in some disciplines and therefore stressed the need to conduct needs assessments for institutions to be able to determine the right areas to continue training to avoid imbalances in the expertise found in the WIO region's marine institutions.

In his talk, Dr. Francis indicated that research currently undertaken in institutions is conducted by students to meet academic requirements and may not be research that meets the needs of the nations in the region. He emphasized the need to train technical and support staff to levels where they are also able to contribute to research work being undertaken. Dr. Francis indicated that there is inadequate utilization of existing capacity within institutions with too few people active in running the institutions. He also stressed that staff motivation is key to the success of the institutions in the WIO region and that there is need to develop succession plans that include recruitment of staff. Other key considerations from his talk were the fact that donor funding will soon end and institutions in the region have to explore how to fund-raise in the future, the need to maintain dialogue with policy makers, and the need to motivate scientific staff by providing them with opportunities for sabbaticals. In his talk, Dr. Francis indicated that key areas for consideration for future funding are modeling, aquaculture and the dissemination of research findings.

6 Special events

Three special events were held during the conference to highlight critical emerging issues. They include:

6.1 Exhibitions of KMFRI research activities:

As a way of reaching out to the public and enhancing awareness on KMFRI's research activities, a special exhibition was held targeting major projects running at KMFRI. These include:

6.1.1 The Enhanced Fish Marketing Information System (EFMIS) Project,

This uses mobile telephony for fish marketing by collecting real time data from various landing beaches around L. Victoria on fish catches, market prices and weather patterns. This information

is then accessed by traders in real time from a database at KMFRI Kisumu by sending *sms* and feedback automatically generated. The service covers fish markets in Nairobi and is planned to cover the whole country by 2011. The service will significantly support fish marketing especially from the national aquaculture program.

6.1.2 Mikoko Pamoja

This is a new project funded by the Natural Environment Research Council (NERC) of the UK under the Ecosystem Services for Poverty Alleviation (ESPA) Programme. The Programme highlighted KMFRI's pioneering mangrove conservation activities supported by research and the possibilities of accessing carbon financing for mangrove conservation. Mangrove products were also displayed. During the special session on the same project, participants were sensitized on mangrove ecosystem goods and services, national REDD preparedness and sub-national REDD opportunities.

6.1.3 Two World Bank funded Projects: SWIOFP (South Western Indian Ocean Fisheries Project and the Kenya Coast Development Project (KCDP)

SWIOFP aims to assess the potential of off-shore fisheries resources and covers nine countries of the WIO region namely: Comoros, Kenya, Madagascar, Mauritius, Mozambique, Reunion, Seychelles, South Africa and Tanzania. The Regional Management Unit and National Management Unit of SWIOFP are hosted at KMFRI.

The KCDP is recently funded and will be implemented for six years. The project aims to empower the local communities through capacity building, advancing of grants under the Community Village Fund (CVF) and Public Private Partnerships so as to improve livelihoods in an environmentally sound manner. KCDP will cover various sectors ranging from fisheries, forestry, agribusiness and tourism. The Project will be coordinated by the Ministry of Fisheries Development with various participating agencies under the ICZM approach. The Project Coordination Unit (PCU) of KCDP will be hosted at KMFRI.

6.1.4 Aquaculture as a major activity under the Economic Stimulus Program (ESP)

Aquaculture activities were also displayed and KMFRI's role in seed production was emphasized. This role will now be more amplified with the upgrading of the Sagana Research Station into the National Aquaculture Research Center with satellite centers at Kabonyo, Kiganjo and Ngomeni.

6.1.5 Post-harvest technologies

Innovations by KMFRI meant to reduce fish losses after harvesting were also displayed ranging from solar driers, improved smoking ovens and a hybrid solar/wind drier.

6.1.6 KMFRI's research activities on L. Naivasha

Research activities ranging from environmental monitoring to fisheries research and relevance for management were also displayed.

6.1.7 WIOMSA

The regional membership organization for coastal and marine science – WIOMSA, which was one of the main sponsors of the Conference, also displayed some products and the activities it runs in the region especially in capacity building. Projects that WIOMSA has supported in KMFRI over the years were highlighted in a poster.

6.2 Lake Naivasha Roundtable

This was the major highlight of the Conference. The Roundtable was preceded by various presentations on the lake and associated ecosystems ranging from water quality, limnology, fisheries research and catchment management. Seven experts representing various disciplines i.e. fisheries research and management, water management, agri-business, catchment management, limnology and ground water were the leading discussants. The participants explored and reached a consensus on the various environmental challenges facing the lake ranging from receding water levels, pollution, catchment degradation and urbanization among others. Most importantly, the participants proposed measures which should be implemented in the short-term and medium term to restore the lake's health. Such measures include: restoration of the lake's riparian vegetation, proper management of waste water, regulation of development, sound catchment management and promotion of the concept known as *Payment for Ecosystem Services* (PES) among others. To ensure an integrated approach in managing the lake and associated ecosystems, the Lake Naivasha Basin Management and Technical Committee was formed comprising membership from various agencies (government institutions, civil society and CBOs). This Committee which will be based in Naivasha will link up with Inter-ministerial one coordinated by the National Environment Management Authority (NEMA) under the Office of the Prime Minister.

6.3 Mikoko Pamoja Special Session

The main focus of this session was to highlight the NERC funded *Mikoko Pamoja* project and assess the feasibility of mangrove REDD projects in Kenya. The session brought together scientists, policy makers, resource managers and local communities to explore challenges and opportunities of accessing carbon financing from the Voluntary Carbon Market (VCM). The international framework for REDD including the Bali COP 13 from which REDD draws its mandate, post 2012 UNFCCC agreement, the Forest Carbon Partnership Facility (FCPF), the UN-REDD initiative and the REDD+ Partnership were discussed. Constraints of quantifying total carbon sequestration potential of mangroves were also highlighted. Information was provided on the opportunities that exist under REDD as a climate change mitigation measure which can help the country address some of the goals under the Kenya National Climate Change Response Strategy.

7 Output of the Conference

Taking into consideration the overall aims and objectives of ARK II, much of the Conference's aspiration and what was envisaged has achieved. This section highlights the major outputs of the Conference, including the key statements, main recommendations and resolutions, as summarized from the scientific presentations of each thematic area.

7.1 Key Statements and Recommendations from Thematic Presentations

7.1.1 Biodiversity and Ecosystem Functions

- We must promote incentive based Payments for Ecosystem Services (PES) despite prevailing impediments
- Concerns of heavy metal accumulation their biomagnifications in fish, other edible species and retention in the sediments is now apparent from newly emerging knowledge
- Continuous biomonitoring is recommended given the dynamism of the aquatic ecosystem (and constant interference human activities and other internal processes)
- Regular surveys of aquatic systems of Kenya, for the update checklists of species and to establish their status are recommended

7.1.2 Fisheries Research and Management

- New approaches are being applied for ageing species and estimating growth rate, which have good potential for aquaculture and fisheries management
- Low adoption rates for innovating fish preservation methods by fisher communities can be linked to various reasons including inadequate of material e.g. ice, expensive containers, lack of knowledge, poor attitude etc
- Challenges of fish storage on lake islands: Ice production capacity is a major constraint while there are logistical constraints in distribution to islands
- The structure of fish landings in selected coastal areas has been conducted. Some results show a shift to less valuable demersal species and more small pelagic species; with some fished beyond MSY
- Recent results show an increase in number of artisanal fishers in the coast by approx. 45% (from 7,000 in mid 1990s to over 10,000 in 2008)

7.1.3 Aquaculture Research and Development

- Results of aquaculture studies outside Kenya are an important contribution in advising the design of management practices in Artemia production ponds locally

- Community participation, technology transfer and marketing of fish and related products are still major challenges that need to be addressed
- Usefulness of integrating remote sensing, GIS and attribute data in selecting suitable sites for the development of aquaculture has been demonstrated and the technology must be built upon
- Rain has been shown to be among the key environmental cues for gonad maturation in some species of the tropical African freshwater catfish
- Socio-economic studies indicate that communities in various parts of Kenya have interest in mariculture as an alternative livelihood and preliminary research demonstrates that there is a potential for mariculture development in Kenya
- Non-conventional feedstuffs with good potential for aquaculture feed have been experimented on and need to be developed further
- Optimal stocking densities for various species suitable for aquaculture in Kenya have been proposed
- Aquaculture is soon beginning to supplement the dwindling fish catches

7.1.4 Limnology and Oceanography

- Models for simulation of hydrodynamic of various creeks in the Kenya coast such as Mtwapa Creek have been developed and tested for their application in sea level changes and their impact. However, additional data on aspects like bathymetry are required through further research especially in Tudor, Mida and Kilifi creeks, Sabaki River Estuary and Gazi Bay
- Kenya's contribution to the regional research agenda is emerging through results from projects such as SWIOFP, ASCLME etc

7.1.5 Climate Change

- Corals under different dominant currents/histories of water temperature have been shown to display varying responses to bleaching stress
- The degradation of ecosystem services as a result of climate change and other causes poses a significant barrier to the achievement of the Millennium Development Goals and to the MDG targets in Kenya
- Priority climate change issues for Kenya mangroves have now been documented

7.1.6 Contemporary Socioeconomic Issues

- Community Based Organisations (CBOs) in the coastal of Kenya operate in a context where community relations are shaped by differences in power and economic influence, politics by social divisions
- There is reluctance to redistribute power and associated responsibilities to CBOs; Government structures tend to act against CBNRM through only limited incorporation
- CBOs seen as extension of government e.g. CFAs assist the KFS in enforcing the provisions of the Forest Act (2005) or Ministry of Fisheries Development in enforcing the Beach Management Unit (BMU) Act 2005

7.1.7 Policy and Management

- A system for generating fish market information from 150 landing sites, markets, input suppliers using SMS via mobile telephony has been developed by KMFRI
- ICT is an important tool for policy formulation and decision making processes in Kenya as demonstrated by the coastal marine environment clearing house mechanism operated by KMFRI and its partners
- Anthropogenic activities comprise the major threats facing lakes in Kenya, status of Lake Turkana which is highly depended on freshwater influx from River Omo is bound to be negatively impacted upon by the ongoing cascading construction of Hydro electric power plants in the neighboring nation of Ethiopia
- The River Omo Delta is a key tran-sboundary resource that requires urgent integrated management intervention to guarantee its future. Recommendation was made for formation a national committee to initiate discussions towards constitution of a cross border (both Kenya and Ethiopia) inclusive committee to spearhead appropriate sustainable management of the delta including a process to recognize it as a wetland of international importance.

8 Evaluation

At the end of the conference participants were requested to complete an evaluation form, the evaluation template completed by the participants is in Annex VIII. A total of 41 participants completed the forms. On the question seeking to know if the Conference expectations were met, 98% of the respondents agreed that it was a great success. Regarding the thematic areas 58% agreed that the conference addressed critical issues related to aquatic resources in Kenya. 80% of the respondents felt that time management during the conference was effective. Similarly, more than 80% said that the time allocated per individual presentation was adequate.

Round table discussions also gained huge approval of the participants and 72% agreed that it was productive. Some 50% of the respondents were satisfied with pre-conference communications.

Although majority of the respondents rated communication prior to conference as good, there were also a significant number of respondents who were either neutral or thought it was poor. On boarding, lodging and travel logistics, more than 65% of respondents were of the opinion that these were good. Most of the participants interviewed were impressed by the standard and overall success of the meeting as can be seen in the figure below (Fig. 2). Future ARK Conferences should however aim at allocating more time for the poster session as most respondents felt it was inadequate.

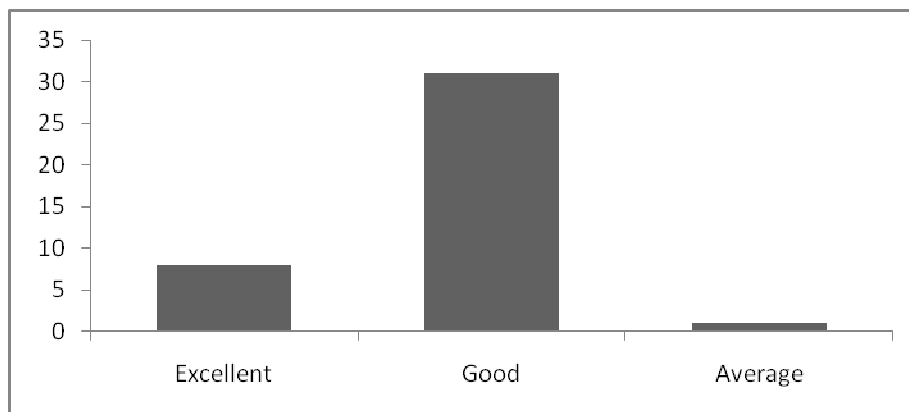


Fig. 2: Outcome of the Conference evaluation

9 Closing and Way Forward

ARK-II Conference was formally closed on 19th October, 2010 by the Assistant Minister for Fisheries Development Mr. Mohammed Abu Chiaba. The Assistant Minister was invited to close the Conference by the Chair of the KMFRI Board of Management, Prof. Penina Aloo-Obudho. In her remarks, Prof. Aloo-Obudho singled out the communiqué on the Lake Naivasha Round Table discussion on L. Naivasha and earnestly requested the Hon. Minister to assist in taking it to the next level of implementation. In his closing remarks, Mr. Chiaba indicated that he looked forward to receiving the relevant recommendations and related products of the Conference that require immediate action by the Ministry. He commended KMFRI for initiating collaborative efforts with other Government department, local and regional organizations and various stakeholders. Full text of his speech is in Annex IX.

KMFRI has approached some journals to produce special issues comprising selected papers from the Conference. WIOMSA has offered to produce an issue covering papers on marine and coastal science in its journal – the Western Indian Ocean Journal of Marine Sciences (WIOJMS). Plans are underway to contact several freshwater journals for special issues.

The ARK Conference has been proposed to be biennial event. Therefore, the next Conference, ARK-III, is likely to be scheduled for the year 2012.

10 Conference Budget

The entire budget to host ARKII conference was KShs 7,688,000. Out of this KMFRI contributed KShs 3,000,000 (or 39%), WIOMSA contributed KShs 1,300,000 (16.9%), KWS gave in-kind contribution of KShs 1,172,000 (15.2%), while Mikoko Pamoja KShs 1,134,000 (14.8). Other direct cash contributions were received from KMFRI Projects, Lake Naivasha Riparian Association (LNRA), KCB and Oserian Flower Company (Table 1).

Table 1: Summary of contributions from partners and well wishers toward ARK II Conference

Contributing Organizations/ Partners	Contribution in cash (KShs) or kind	% Contribution
KMFRI	3,000,000	39.0
WIOMSA	1,300,000	16.9
KWS	1,172,000	15.2
Mikoko Pamoja	1,134,000	14.8
KMFRI projects	748,000	9.7
LNRA	184,000	2.4
KCB	100,000	1.3
Oserian	50,000	0.7
Total	7,688,000	100

11 Annexes

Annex I – Welcome Remarks by the Director, KMFRI

Annex II - Speech by Chairman, KMFRI Board of Management

Annex III - Speech by Permanent Secretary, Ministry of Fisheries Development

Annex IV - Opening speech by Guest of Honour, Minister for Fisheries Development

Annex V - Outline of the Conference Programme

Annex VI - Lake Naivasha Communiqué

Annex VII - List of Participants

Annex VIII – Conference Evaluation Template

Annex IX - Closing Speech by Assistant Minister, Fisheries Development

Annex X - List of Chairs and Rapporteurs

Annex XI - Members of the National Organizing Committee

ANNEX - I

SPEECH BY DR. KAZUNGU, JOHNSON M., DIRECTOR/KMFRI DURING THE OFFICIAL OPENING OF THE 2ND INTERNATIONAL ANNUAL SCIENCE CONFERENCE ON ‘AQUATIC RESOURCES OF KENYA’ HELD AT THE KWS TRAINING INSTITUTE, NAIVASHA; 16 – 19TH NOVEMBER 2010

**The Minister for Fisheries Development – Hon. Jeffah Kingi,
The Permanent Secretary, Prof. Micheni Ntiba,
Member of Parliament, Naivasha Constituency, Hon. John Mututho,
The Chairman, KMFRI Board of Management, Prof. Peninnah Aloo-Obudho,
KMFRI Board Members,
Director KWS,
Directors from different Organizations,
Provincial Commissioner, Rift Valley Province,
His Worship the Mayor for Naivasha Municipality
Distinguished guests,**

ALL PROTOCOLS OBSERVED

Ladies and Gentlemen,

Aquatic Ecosystems have continued to experience numerous challenges over the years due to a number of local and external factors. The topical issue now is the effects of changing climatic conditions on different habitats and the responding resilience and adaptation abilities within ecosystems.

The challenges of coastal erosion and sea-level rise are now so real that their effects are already being felt at the Kenya Coast. Within the lakes regime, drastic reduction of water levels due to changing climatic conditions have already led to reduction of fish stocks (due to reduction of breeding and nursery grounds) and creation of severe environmental conditions as those noticed in Lakes Baringo and Naivasha.

Since these problems are experienced world-wide, there are a number of global interventions complimenting local country efforts. The Intergovernmental Oceanographic Commission of UNESCO of which Kenya represented by Kenya Marine and Fisheries Research Institute (KMFRI) is a member has recognized four High-level Objectives in tackling various issues related to coastal aquatic systems. These includes; (i) Prevention and reduction of impacts of natural hazards, (ii) Mitigation of the impacts of, adaptation to, climate change and variability, (iii) Safeguarding the health of ocean ecosystems and (iv) Management procedures and policies leading to the sustainability of coastal and ocean environment and resources.

KMFRI’s research activities are therefore aligned not only on generation of information for local use, but also to contribute onto international programs having direct and indirect bearing to our

marine environment. Some of KMFRI's activities that contribute information to international programmes include the sea-level measurements at Mombasa and Lamu which contributes to the Tsunami Early Warning Programme under the Global Ocean Observing System of IOC-UNESCO and the Ocean Data Information Africa Programme (ODINAFRICA) currently being managed by a KMFRI scientist in Oostende, Belgium.

Distinguished delegates,

As we join our collaborators in celebrating the official opening of our 2nd International Conference on Aquatic Research for Development, it is important to reflect on KMFRI's journey this far.

KMFRI was established by an Act of Parliament (Science and Technology Act, Cap 250 of the Laws of Kenya) in 1979 after the collapse of the East African Community. Previously, Marine and Fisheries research was undertaken by the two organizations of the Community: the East African Marine Fisheries Research Organization (EAMFRO) and the East African Freshwater Fisheries Research Organization (EAFPRO).

KMFRI's mandate is implemented through taking cognisance of various Government development policies such as the 'Economic Recovery Strategy for Wealth and Employment Creation (2003 – 2007)', the Kenya Government's Millennium Development Goals, the National Oceans and Fisheries Policy 2008 as well as the 1st Medium Term Plan (2008-2012) within Kenya's Vision 2030. All these programmes are geared into contributing towards national strategies for food security, poverty alleviation, and employment creation.

Hon Minister,

KMFRI as a national research institution with unique and specialized facilities has attracted partnerships with various national and non-governmental organizations. KMFRI hosts university students from different parts of the world undertaking postgraduate research and also offers opportunities for industrial attachment to polytechnic and college students, most of who are also supervised by KMFRI scientists. Our new state - of - the art Research Vessel 'R.V. UVUMBUZI' at Lake Victoria with modern aquatic research equipment has created a better opportunity of collaboration with universities offering aquatic science courses.

To maximize on research output, KMFRI also collaborates on research programs with a number of regional and international institutions. These include Lake Victoria Basin Commission, West Indian Ocean Marine Science Association (WIOMSA), Lake Victoria Fisheries Organization (LVFO), International Ocean Institute (IOI), IOC-UNESCO, FAO and foreign universities like McGill University and University of Bremen, University of Hull, Britain; State University of Gent, and Free University of Brussels, Belgium; University of Boston, USA; United Nations University in Iceland, Dalhousie University, Canada in addition to our local national universities.

KMFRI has also worked on a number of research projects funded by some leading development partners including: the World Bank, European Union, GEF, NORAD, UNEP, UNESCO, SIDA-SAREC and recently also with the International Labour Organization among others.

Since the year 2000, KMFRI has adopted a multidisciplinary programme approach in research based on six research programmes, which are implemented at both the Marine and Coastal Waters and also Inland Water ecosystems such as lakes and riverine systems.

Ladies and Gentlemen,

We acknowledge that our aquatic ecosystems are confronted by environmental and climatic threats which call for an integrated ecosystem approach to the management of the habitats.

This conference, hence offers a very good opportunity to discuss and chart out a way forward on the steps that must be undertaken to save our aquatic ecosystems. To this end, we appreciate the collaboration of our key stakeholders, more particularly Kenya Wildlife Services (KWS) and the Western Indian Ocean Marine Science Organization (WIOMSA) for co-hosting the conference. We are equally indebted to our partners, namely; Kenya Commercial Bank, Oserian, Mikoko Pamoja, Kenya Wildlife Service Training Institute, Lake Naivasha Riparian Association and many others for their valuable contributions geared on ensuring the success of this conference. We should all pull together in ensuring survival of our aquatic ecosystems.

ANNEX-II

THE SPEECH OF PROFESSOR PENINAH ALOO-OBUDHO, CHAIRMAN OF THE KMFRI BOARD OF DIRECTORS, ON THE OCCASSON OF THE OFFICIAL OPENING OF THE KMFRI SECOND INTERNATIONAL ANNUAL SCIENCE CONFERENCE ON “AQUATIC RESOURCES OF KENYA (ARK II)” HELD AT THE KENYA WILDLIFE SERVICE TRAINING INSTITUTE CONFERENCE HALL ON 16 – 19TH NOVEMBER 2010.

The Minister for Fisheries Development, Hon J. Kingi, EGH, MP

**The Permanent Secretary, Ministry of Fisheries Development, Prof. Micheni Ntiba,
Member of Parliament for Naivasha Constituency, Hon. Mututho, MP.**

Members of the KMFRI Board of Management.

**Director of KMFRI, Dr. Johnson Kazungu, Director KWS, Dr Julius Kipng’etich, all other
Directors present.**

Provincial Commissioner, Rift Valley province

Officer Commanding police Division (OCPD) Naivasha

His Worship the Mayor for Naivasha Municipality

Invited Scientists

Distinguished Guests

Ladies and Gentlemen

It gives me great pleasure to welcome you to this important conference. This is a great occasion and a very special event for Kenya Marine and Fisheries Research Institute. I am particularly delighted as the Chairman of the KMFRI Board because this conference is a milestone among the achievement agreed between my Board and the KMFRI Management this year (2010). I must mention that we had planned to hold this conference earlier at this same venue in May 2008, but were turned off by the problem that arose in the country following the 2007 elections.

Honorable Minister, since our appointment to the Board, we have taken serious steps to make KMFRI more visible and efficient in service delivery. In November 2009, the Board took a bold step to hold a joint management workshop with senior management staff at the institute, where the main objective was to come out with clear recommendations for a paradigm shift in the way KMFRI handled research and the public outlook. Our focus was to create a strategy for effective service delivery and for meeting the challenges arising from the changing socio-economic environment under which the institute operates. The workshop on *RE-INVIGORATION AND RESTRATEGIZING THE INSTITUTES MANDATE AND VISION TO MEET THE CHALLENGES OF FISH PRODUCTION FOR WEALTH CREATION AND POVERTY ALLEVIATION* was a great success. Apart from the drive to successfully hold this conference as a deliberate move to disseminate data, information, and new technical innovations, review works were discussed and initiated for a number of policy documents guiding the contact for research; namely: the KMFRI strategy plan for 2010 – 15, KMFRI Research Policy, and the

KMFRI Intellectual Property Rights Policy. To remain relevant in line with the current Government Development Plans, the institute re-re-examined its mandate and vision in line with the changing roles of state co operations in the economy.

Hon Minister, Distinguished Guests, Ladies and gentlemen, the workshop broadly considered issues concerning the need to restructure the institute for national outlook in line with the emerging socio-political, Physical, Chemical, Biological and economic environmental scenario in the country. I am glad to inform you that, the structure agreed upon for the effective management and service delivery at KMFRI should play well into the foreseen Government structures of the new constitutional dispensation.

Hon Minister, Ladies and Gentlemen, without taking more time, I would like to welcome you to the rest of the sessions of this conference so that you can appreciate the content and contribution to the conference. You note that we have a full day session dedicated to issues around Lake Naivasha. The round table discussion planned in this session should provide an equal opportunity for all participants to contribute towards best management practice for our lakes, rivers, oceans and associated ecosystems. Lake Naivasha has been very frequent in the news over massive fish kills and other environmental issues. Our Ministry always takes the brand for such news even though the real causes of the problem are remote from the fisheries. For a start, it will be important to capture all (if not, most) views on issues relating to the management of Aquatic Resources and Environment from the discussions on Lake Naivasha and come up with a brief for policy on best practice. Also, Hon Minister, Ladies and Gentlemen, “**Mikoko Pamoja**”, is listed for round table discussion as a special approach to the role of forest cover on Global Warming and Climate Change and how communities involved in afforestation or protecting forest cover could benefit from the International Carbon Market. In brief, the sessions ahead are loaded with useful information. There are also planned posters and demonstrations on some of the projects undertaken at KMFRI. Please, take time and sample all these sessions.

It is in this regard, Hon Minister, Distinguished Scientists, Ladies and Gentlemen, that I take this humble opportunity to welcome you to this conference. We greatly appreciate your participation and contributions to the discussions we are going to have during these four days. I can assure you that your personal contribution and experiences will provide us with a clear road map for further re-invigorating and re-strategizing our vision and mission for research.

Hon Minister Sir, Ladies and Gentlemen, KMFRI has been in existence since 1979, when it was established by the Science and Technology Act, CAP 250 of the laws of Kenya. Over the years, the Government Development Plans have been changing and demanding equivalent shifts in priorities for research. Under the Ministry of Fisheries Development, KMFRI has substantial support for research. I am happy to confirm that the institute will continue to play the major role in developing Aquaculture across the country under the National Economic Stimulus Programme (ESP) for Aquaculture. As a Board, were are delighted with the three stations at Sagana, Kiganjo and Kabonyo, which the Ministry has requested KMFRI to take over and operate and create the

National Aquaculture Centre for Research, Training and Development for the national posterity of Aquaculture. In this respect, Hon Minister, I hasten to promise you on the behalf of myself, the Board and KMFRI staff, that we will do our best to ensure that the centre provide the requisite technical support for fish farming in the country. We are working 24 hours seven days to ensure that there is enough fish seed and feeds for all fish farmers across the country and some extra for export.

Honorable Minister, I wish at this juncture to reiterate, that research is the engine that drives development worldwide. In the developed nations, governments depend on technologies from research which are used to guide the national development agenda. The vision of KMFRI is to be a center of excellence in aquatic research and promotion of sustainable utilization of marine and freshwater resources. To live up to this vision, KMFRI should undertake quality research. The policy documents for research and intellectual property rights and the reviewed KMFRI strategic plan have been developed in line with the government development in the Kenya VISION 2030. Sir, the approval and subsequent launch of the Oceans and Fisheries Policy and the on-going process of enacting the Oceans and Fisheries Bill are clear indications on the direction your ministry would like KMFRI to follow. For KMFRI to remain relevant and effectively perform its role in the sector as well as national economy, the exercise we are going through this week will remain a great milestone to be replicated annually for the future of the institute.

Last, but not least, Hon Minister, we are aware of the challenges the fisheries sector has faced especially with crush of the Nile perch stocks on Lake Victoria, and inability to access the stocks in our EEZ and Lake Turkana, and the efforts the ministry is putting in place to address these challenges. However, our efforts to assess and monitor these resources and bring up the relevant data for the sector's exploiting are hampered by lack of critical equipment at out stations. Over the years, we have requested without success to be assisted to procure and operate an oceanographic Research vessel in our coastal waters. The road network to Lake Turkana remains a hindrance to beneficial exploitation and utilization of Lake Turkana fish resources. I would like to end my remarks with an appeal to your office to locate resources for an Oceanographic Research Vessel to enable KMFRI conduct offshore surveys advice on the available fish stocks. Finally sir, our research activities on Lake Victoria was recently boosted by the Research Vessel RV Uvumbuzi, which was launched by your predecessor. We are working in collaboration with Tanzania and Uganda to bring to rest the issues on Nile perch fishery.

Finally, Hon Minister, I would like to thank you for finding time out of your busy schedule to come and open this conference. We encourage you Sir to stay on with us to listen to a few of the papers since we are aware of your tight programme.

I commend the efforts of the KMFRI management for enabling this conference to take place and all the participants for accepting our invitation. In particular, I wish to acknowledge the speakers

who are going to address this conference for the effort they have put in the preparation of their presentations.

ANNEX – III

DRAFT SPEECH FOR PROF. JAPHETH M. NTIBA, THE PERMANENT SECRETARY, MINISTRY FISHERIES DEVELOPMENT ON THE OCCASSON OF OFFICIAL OPENING OF THE SECOND KMFRI SCIENCE CONFERENCE ON AQUATIC RESOURCES OF KENYA (ARK II) HELD AT THE KWS TRAINING INSTITUTE, NAIVASHA ON 16TH NOVEMBER 2010.

**Hon J. Kingi, MP, EBS. Minister of Fisheries Development
Chairman and Members of the KMFRI Board of Management
Area Member of Parliament Hon Mututho,
Provincial Commissioner for Rift Valley Province,
His Worship the Mayor for Naivasha Town,
Directors present,
Distinguished Scientists,
Invited Guests,
Ladies and Gentlemen.**

It gives me great pleasure to join you on this auspicious occasion of the official opening of the second international science conference on Aquatic resources of Kenya (ARK II).

Distinguished Scientists, Ladies and Gentlemen, I must admit that I have been very keen, in my various capacities, waiting for this occasion. You will note that between ARK I and ARK II are close to three decades apart. This is not a good record. The scientists who attended ARK I in 1981 (those who are still alive and active in research), must have shared my anticipation and waiting. KMFRI has had three Directors ever since. I am aware that previous Boards at KMFRI tried to achieve this with no success. I therefore congratulate you Chairman and your Board for this great achievement. I also congratulate the Director and KMFRI staff and all of you who have found time and dedicated resources to support and participate on this important conference.

Distinguished Guests, Scientists, Ladies and Gentlemen, KMFRI has had many other internal and international fora at which they have promulgated their research findings. The timing, however, of this conference could not be better. The country has entered a new constitutional dispensation, with expectations for a new beginning from all corners and in every sphere of life. As a ministry and for that reason, a sector, we are on the run to fit our level best, especially in devolved Governance. This conference therefore marks the apex for the past and a beginning for the future in Marine and Fisheries Research. For those who may not be aware, the word “MARINE”, as used in CAP 250 of the laws of Kenya which created KMFRI in 1979,

encompasses all non fish and fisheries aspects of marine and freshwater aquatic resources and environments. The physical, chemical, biological, geological, socio-political and economic environments are crucial for the development, exploitation and utilization of fisheries and aquaculture.

Ladies and Gentlemen, prior to the new constitutional dispensation, the march to restructure in the fisheries sector started in earnest with the launch of the National Oceans and Fisheries Policy of 2008. The policy recognized the leadership role research, science and innovative technological must play towards achieving the sectoral objectives enshrined in the tenets of the Kenya Vision 2030. The next crucial steps in the sectoral re-organization and revitalization for effective service delivery are the Parliamentary approval of the pending Bill on the National Oceans and Fisheries Act and finalizing the National Aquaculture Development Strategy/Plan. In order to fast track these developments, the ministry has taken steps to restructure both KMFRI and the Department of Fisheries in preparation for the devolved Management in County Governance. The process towards a National Aquaculture Development has received enormous support from Government through the National Economic Stimulus Programme (ESP I) of 2009/2010 and the ERPARDP or ESP II of the 2010/2011 Financial Years (respectively). Through these programmes, the Ministry has been able to map the entire country for suitability to farm fish, and put in place the necessary environment and structures for fish farming across the country.

In line with the above, Ladies and Gentlemen, the ministry has transferred the management and operations of Kabonyo, Sagana, Kiganjo, and Ng'omeni to KMFRI in order to improve the institute's capacity to spearhead the Government Development Plans and Programmes on Aquaculture. Government will continue this trend to restructure and facilitate KMFRI to strengthen capacity to undertake research and provide informed guidance in Oceanography, Fisheries and Aquaculture for national development. I expect therefore, that from this conference on, KMFRI should make this an annual event in the calendar of activities, where stakeholders should meet to review progress and chart the way forward for the next years' research agenda. Stakeholders, including scientists, policy makers, resource managers, private sector, and the political class must take their rightful position and ensure that public resources put into research yield results for sustainable resources management, exploitation, and utilization. To achieve this we need frequent meetings and annually planned sessions to exchange views, share experiences and make determined plans. If you allow me, distinguished Ladies and Gentlemen, without the risk of repeating myself, I wish to re-emphasize the fact the sixth pillar in the Foundations for the Kenya Vision 2030 is Science, Technology and Innovation (STI), which are the products of Research. You can therefore be assured that I definitely looking forward to the product of this conference and where possible the resolutions for future undertakings.

Having said the above, Hon Minister, Ladies and Gentlemen, I would like to commend the efforts by KMFRI and all the researchers gathered here, for the efforts they have put in

developing the papers that are going to form the agenda for this conference. I am informed that the turn out for papers at the call for abstracts was overwhelming, with over 250 applications. This is testimony that the scientific community is active. As a scientist myself, I commend you for this. In fact, I would have wished to stay and listen to all the planned oral and poster presentations and exhibitions. I therefore join you in appreciating all the invited keynote speakers for accepting to add this conference to their schedule of work and come out of their very busy offices to deliver their papers. Thank you all.

Hon. Minister, Distinguished Scientists, Ladies and Gentlemen, I note with candid memory, that Lake Naivasha provides a good example of environmental degradation witnessed in water bodies all over the world. The recent massive fish kills on the lake raised more questions than answers. We are also aware of the disappearance of flamingoes in the region, collapse of the Nile perch fishery on Lake Victoria, and the current problems with the Mau. These are signs that all is not well with our ecosystems, and calls for serious attention and need to protect these aquatic ecosystems from further destruction. Further, Hon Minister, Ladies and Gentlemen, the coastal and oceanic waters are a major resource with huge impacts on the global climate. The entire area of the Kenyan EEZ remains remote to all of us.

I am however encouraged to note that these issues are going to be addressed in the course of this conference. In particular, I appreciate the planned daylong session and round table discussions on Lake Naivasha and the planned offside discussions on mangrove forest cover at the coast, in relation to deforestation, land and water resources use and management, and carbon banking and mitigation for climate change. I like wise encourage you to take advantage of these sessions and provide clear resolutions in the way forward for the management, and sustainability of these water bodies.

Last but not least, **Ladies and Gentlemen,** I wish to reiterate that the Ministry recognizes the importance of research in generating appropriate scientific information, Technologies and Innovations crucial for the development of the sector. Indeed, KMFRI as the lead agency will continue to receive the relevant support necessary to promote research for development. In line therefore, with the Government restructuring plan for better and effective service delivery, my ministry has restructured management and operations of the Sagana Aquaculture Centre, and the Centres at Kabonyo (in Nyanza), Ng'omeni (at the Coast) and Kiganjo (in Kirinyaga) to constitute the National Centre for Aquaculture Research, Training and Development, with Sagana as the centre and the others being satellite stations, and placed it under the full control of KMFRI. As we entrench the new constitutional dispensation, the centre has been structured to oversee the national development of Aquaculture, train, develop and advise all counties on best aquaculture practice. The centre will spear head all Aquaculture development in the country, with KMFRI as the lead agency providing the science and leadership. KMFRI will therefore

engineer and contact scientific and innovative research and run appropriate training programmes for technology transfer at the centre.

Finally **Ladies and Gentlemen**, and in regard to the above, I am happy to note the progress KMFRI has made with the delivery of information through Enhanced Fish Market Information Service (EFMIS), where modern cell phone technology is used to provide market information in a timely and cheaper manner. I urge the fisher communities to take advantage of this technology once it is availed to enhance their incomes. My ministry has planned to improve on the service to enables fishermen, traders and other interested groups to get fish price data from across country simply by using their mobile phones at any time.

ANNEX - IV

ADDRESS BY HON. J. KINGI, MP, EGH, MINISTER FOR FISHERIES DEVELOPMENT, ON THE OFFICIAL OPENING OF THE SECOND KMFRI SCIENCE CONFERENCE ON AQUATIC RESOURCES OF KENYA (ARK II), HELD AT THE KENYA WILDLIFE SERVICES (KWS) TRAINING INSTITUTE, NAIVASHA, ON 16TH JUNE 2010.

**The Permanent Secretary, Ministry of Fisheries Development,
Chairman and Members of the KMFRI Board of Management,
Area Member of Parliament Hon Mututho,
Provincial Commissioner for Rift Valley Province,
His Worship the Mayor for Naivasha Town,
Directors present,
Distinguished Scientists,
Invited Guests,
Ladies and Gentlemen.**

It is indeed a great honor and my pleasure, this morning, to join you on this auspicious occasion of the official opening of the second international science conference on Aquatic resources of Kenya (ARK II).

The biblical Noah's ARK saved the mankind and all living animals from the raging floods. Though I am told that ARK II has nothing to do with the floods of Noah's time, I wish to draw a parallel comparison of the current shortages and poor levels of nutrition in the country to the biblical floods. We are aware that at the time NARC took Government in 2002, the struggle towards the second liberation took a defined course and has been focused on redeeming the Kenyan Mwananchi from uncontrolled hunger due to frequent food shortages, corruption in Government, dilapidated and poorly designed infrastructure, lack of rewarding employment, and basically wastage of hard earned national resources. In pursuit of the NARC programmes, the grand coalition Government voted to invest national resources in developing people friendly

programmes through improved governance and infrastructures, and working towards food security, provision of health amenities including clean potable water, and creating markets both in and out of the country. It was inevitable, that to achieve true liberation for the common Mwananchi, the country needed a complete overhaul of the constitution with a new dispensation. We now have the constitution in place and you are all aware that in the strategy for the Kenya Vision 2030, Research, Science and Technology has been accorded priority to spearhead development.

At the regional level, **Ladies and Gentlemen**, we have teamed up with our neighbor states especially under the EAC protocol, and through COMESA and IGAD to create common and vibrant market for our goods and services and allow our people to contact fair and open business across the borders. Fisheries issues are on the frontline to provide food, and create jobs and wealth for our people. To prosper, we need a healthy nation and wealthy people.

Distinguished participants, **Ladies and Gentlemen**, in line with the above, the Kenya Government identified fisheries and fishing as a prime area for development with potential to create faster impacts and real gains to the small scale household level economies, and created a fully fledged Ministry of Fisheries Development. This ministry has the critical but most potential role to turn round the living standards of the Kenyan people right from grassroots at household. During the 2009/10 Financial Year, the Ministry was allocated Ksh.1.2B for national Aquaculture development under the Economic Stimulus Programme (ESP), which was raised this FY to Ksh.2.2B to Fish Farming Productivity under the Economic Recovery, Poverty Alleviation and Regional Development (ERPARD) Programme or simply put ESP II. I am happy to report that the programme for Aquaculture Development has opened up the entire country to fish farming with over 48,000 fish ponds and 480 water dams in 160 constituencies spread out in all counties across the country, and a potential yield of over 20,000 metric tons of fish and a value close to Kshs6.0B direct to farmers.

Furthermore, **Ladies and Gentlemen**, in pursuit to develop capture fisheries, my Ministry presented a Cabinet memo (CAB (09) 42 of 14th Oct 2010) which has since been approved with directions for the recovery of the Lake Victoria Nile perch fishery, and for development, exploitation and utilization of the potential resources in Lake Turkana and the expanded 350nm Exclusive Economic Zone (EEZ) off Kenya coast. This is a clear testimony of the Government's commitment to streamlining aquatic resources in the Kenyan Economy.

The point is, **Ladies and Gentlemen**, that through the programmes stated above, the Government is facilitating fish production as part of the wider programme on food security, and for disease and poverty reduction. This conference has indeed come at the right time for scientists, managers, policy makers, and all concerned stakeholders to put their heads together, and come out with clear resolutions on the way forward for sustainable development, exploitation, and utilization of the aquatic resources of Kenya. **Ladies and gentlemen**, My Ministry recognizes the leading role research, science and technology must play to propel the

fisheries sector from mere hunters' to an industrialized base. The meaning of my analogy on the Noah's Ark in reference to the title of this conference is founded on the role for research in the National Oceans and Fisheries Policy of 2008. We are well aware of the pertaining situation of the fisheries sector in Kenya, especially concerning the challenges from the declining Lake Victoria fish stocks, and the lack of access to the Lake Turkana and the expanded Exclusive Economic Zone (EEZ). Science must therefore provide appropriate and well researched Innovative Technological solutions to these challenges. I note with satisfaction that through collaborative programmes, Kenya Marine and Fisheries Research Institute has undertaken research, made great strides in collecting, collating and assessing data and information for both marine and inland waters resources development and management, has built unique capacity for aquatic research in the region, and developed innovative technologies for improving aquatic resources utilization. This conference should be an excellent show case as it provides a rare but crucial opportunity for you to evaluate the new scientific information and come with resolutions for sustainable development, appropriate utilization and management of the aquatic resources in totality.

Ladies and gentlemen, My ministry is fully aware and very concerned of the worsening status of environment in and around the lakes and rivers in the Rift Valley. In particular, we are very concerned about the rapid decline of the water quality in Lakes Naivasha, Nakuru and Baringo. Only recently, Lake Baringo had a major fishery with an important market. The fishery on Lake Naivasha has had a checkered history of collapse and recovery. The recent massive fish kills on the lake raised serious environmental concerns, especially for the riparian communities. Environmental issues supersede other developmental issues since environment determines the health status of any ecological system. Even on Lake Victoria and the wider Indian Ocean, the quality of the water environment definitely affects the quality of production and products. My Ministry, will continue to collaborate with other main stream ministries, organizations and institutions on ensuring clean and productive aquatic environment in all our water bodies (whether small or large). We need clean water for domestic use and for livestock crop production. I note with appreciation that during this conference, time has been set aside for focal discussions on issues of Lake Naivasha and mangrove deforestation at the coast. It is my wish and indeed that of my ministry that the resolutions arrived at during the round table and other plenary discussions inform the national plan mitigation and adaptation to Climate Change.

Ladies and gentlemen, I wish to reiterate that my Ministry recognizes the importance of research in generating Appropriate Scientific Information, Technologies and Innovations crucial for the development of the sector. The Oceans and Fisheries Policy published and launched last year fully supports. The policy clearly outlines the Government's commitment to facilitate research through building capacity and financing specific research and development programmes. And indeed, KMFRI as the lead agency, continue to receive appropriate support necessary to promote research for development. In line with Government restructuring plan for better and effective service delivery, my ministry has restructured the Sagana Aquaculture

Centre, and the Centres at Kabonyo (in Nyanza), Ng'omeni (at the Coast) and Kiganjo (in Kirinyaga) to constitute the National Centre for Aquaculture Research, Training and Development based at Sagana with others as satellite stations under the full control of KMFRI. The centre will spear head Aquaculture development in the country, with KMFRI providing the science and leadership. As we entrench the new constitutional dispensation, the centre has been structured to oversee the national development of Aquaculture, and train, develop and advice all counties on best aquaculture practice. KMFRI as the lead agency will engineer and contact scientific and innovative research, and run appropriate training programmes for technology for transfer of technology.

In this regard, **Ladies and Gentlemen**, I am happy to note the progress KMFRI has made with the Enhanced Fish Market Information Service, a programme which uses modern cell phone technology to provide market information in a timely and cheaper manner. My ministry has planned to improve on the service to enables fishermen, traders and other interested groups to get fish price data from across country simply by using their mobile phones at any time. I urge the fisher communities to take advantage of this technology once it is availed to enhance their incomes.

Finally Ladies and Gentlemen, I take this opportunity to thank all those institutions and individuals who in one way or another, have contributed to the success of this conference. In particular, may single out those who have burned midnight oil to develop papers, posters and other displays to present during the conference and all those institutions and organizations who have provided support, in kind and material, for the organization of the conference. I am particularly encouraged by the number and international nature of the key note papers. I congratulate the organizing committee for a job well done.

Ladies and Gentlemen, thank you all for finding time to participate in this conference.

ANNEX – V

OUTLINE OF THE CONFERENCE PROGRAMME

16 November 2010			17 November 2010	18 November 2010			19 November 2010
08:00			09:00	09:00			09:00
<i>Registration</i>			<i>Keynote Presentations</i>	<i>Keynote Presentations</i>			<i>Keynote Presentations</i>
09:00				10:20			10:20
<i>Official Opening Ceremony</i> Chief Guest : Minister for Fisheries Development				ROOM 1 Biodiversity & Ecosystem Functions	ROOM 2 Policy & Management	ROOM 3 Limnology & Oceanography	COFFEE/TEA BREAK
10:00			10:20	11:20			10:50
COFFEE/TEA BREAK			COFFEE/TEA BREAK	COFFEE/TEA BREAK			ROOM 1 Fisheries Research & Management (cont'd)
10:30			10:50	11:40			ROOM 2 Contemporary Socio-economic Issues
<i>Keynote Presentations</i>			Lake Naivasha Presentations	ROOM 1 Biodiversity & Ecosystem Functions (Cont'd)	ROOM 2 Policy & Management (Cont'd)	ROOM 3 Limnology & Oceanography	ROOM 3 Mikoko Pamoja (Swahili Seas Mangrove Project)
11:50				12:40			
ROOM 1 Fisheries Research & Management	ROOM 2 Aquaculture Research & Development	ROOM 3 Biodiversity & Ecosystem Functions		Contemporary Socio-economic Issues			
13:30			13:10	13:40			12:30
LUNCH			LUNCH	LUNCH			LUNCH
14:30			14:00	14:40			Excursion
ROOM 1 Fisheries Research & Management (Cont'd)	ROOM 2 Aquaculture Research and Development (Cont'd)	ROOM 3 Biodiversity & Ecosystem Functions	Lake Naivasha Roundtable	ROOM 1 Limnology and Oceanography	ROOM 2 Policy & Management (Cont'd)	ROOM 3 Contemporary Socio-economic Issues	
15:30			16:30	16:00			
COFFEE/TEA BREAK			COFFEE/TEA	COFFEE/TEA BREAK			
15:50			17:00	16:30			
ROOM 1 Fisheries Research & Management (Cont'd)	ROOM 2 Aquaculture Research & Development (Cont'd)	ROOM 3 Biodiversity & Ecosystem Functions (Cont'd)	<i>Poster Session</i>	ROOM 1 Limnology and Oceanography (cont'd)	ROOM 2 Climate Change	ROOM 3 Contemporary Socio-economic Issues cont'd	
18:00				17:30			
Cocktail				<i>Poster Session</i>			

ANNEX - VI

COMMUNIQUÉ ON THE FUTURE OF LAKE NAIVASHA AND ASSOCIATED ECOSYSTEMS

We the delegates sitting during the Aquatic Resources of Kenya Conference held in Naivasha from the 16th to the 19th of Nov 2010 convened a special Roundtable Session on **The Future of Lake Naivasha and Associated Ecosystems** during which we:

Appreciated the enormous importance of the Lake ranging from supporting rich fisheries, birdlife and biodiversity in general, water supply among others;

Noted with concern the environmental challenges facing the lake ranging from:

1. Falling water levels
2. Infestation by invasive species
3. Declining fisheries production
4. Increased sedimentation of the lake
5. Discharge of untreated municipal and agricultural wastewater
6. Episodic algal blooms
7. Degradation of riparian vegetation and
8. Unregulated development on the riparian zone
9. And others

Affirmed the need to undertake urgent measures to mitigate the above environmental challenges among others. Such measures shall include:

1. Restoration of the riparian vegetation including removal of illegal development on the aforesaid riparian zone;
2. Adherence by both industry and the municipality to appropriate waste water discharge standards according to NEMA regulations;
3. Expansion of the municipal sewage treatment works currently serving a mere 10% of the population to ensure proper treatment of municipal wastewater;
4. Regulating development of settlements, which have currently exceeded the carrying capacity of the municipality ;

5. Rapid mapping of L. Naivasha catchment to determine the extent of degradation so as to inform urgent catchment restoration with high level government support as was the case for the Mau complex;
6. Promotion of the concept of Payment for Ecosystem Services (PES) covering the whole basin;
7. Fast tracking the development of the Lake's Integrated Management Plan currently being spearheaded by the Kenya Wildlife Services by ensuring comprehensive stakeholder engagement to lend the process legitimacy and ownership;
8. Implementation of the Water Allocation Plans developed by the Water Resources Management Authority (WRMA), including urgently setting and enforcing water abstraction limits.

Recommended that NEMA with its overarching mandate on environment management under EMCA urgently strengthens its capacity on the ground and ensure implementation of resolutions contained herein among others for the sustainable of the Lake and associated ecosystems.

To give NEMA requisite technical support, the delegates strongly recommended the establishment of the **Lake Naivasha Basin Management Technical Committee**, whose membership shall constitute the following institutions: KMFRI, KWS, WRMA, NEMA, KFS, LNRA, Fisheries Department, WWF, Municipal Council of Naivasha, LNGG, Naivasha Civil Society Forum, Universities of Nairobi, Egerton & Kenyatta, Nature Kenya, the MP for Naivasha and a representative from the Office of the Prime Minister. This Committee to be chaired by KWS shall have the following Terms of Reference among others:

- ✓ Quantify and rank the risks and hazards impacting the Lake Naivasha Basin and develop an action plan;
- ✓ Follow up on issues raised from round table discussions;
- ✓ Surveillance of existing activities on the ground that may impact on the integrity of the L. Naivasha Basin
- ✓ Develop Informed inputs to policy developments affecting the L. Naivasha Basin;
- ✓ Liaise with the **Inter-ministerial committee on L. Naivasha which NEMA chairs**;
- ✓ Monitoring the implementation of the L. Naivasha Integrated Management Plan when it shall come into effect and ensure it is all inclusive from a multi-sectoral approach;
- ✓ Act as the official spokesman on environment issues for the L. Naivasha Basin management;

- ✓ Conduct scientific monitoring of the Lake Basin to inform management and also provide data which can serve as a warning sign for any impending disaster for appropriate mitigation;
- ✓ Fundraising to support the Committee and Basin management activities.

To fast-track implementation of resolutions contained in this Communiqué, it was recommended that the:-

1. L. Naivasha Basin Management and Technical Committee convenes as soon as possible;
2. Resolutions in this Communiqué to be tabled in the OPM's office next Wednesday November 24th during which a function on L. Naivasha will be held;
3. Resolutions in this Communiqué to be presented to the Permanent Secretary Ministry of Environment and Mineral Resources who has support for this process prior to this meeting.

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ANNEX - VIII

2nd CONFERENCE ON AQUATIC RESOURCES OF KENYA (ARK II)

16th-19th November, 2010

Kenya Wildlife Service Training Institute, Naivasha, Kenya

CONFERENCE EVALUATION FORM

Please indicate (*by ticking as appropriate*) your impressions of the items listed below.

Comments on Conference Sessions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The conference met my expectations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Themes adequately addressed critical issues related to aquatic resources of Kenya.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Time management was proper	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Time allocated for presentations was adequate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Presentations were appropriately assigned to the themes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comments on welfare	Excellent	Good	Fair	Poor	Very poor
6. Pre-conference communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Conference venue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Meals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Accommodation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. How do you rate the conference overall?					
Excellent	<input type="radio"/>	Good	<input type="radio"/>	Average	<input type="radio"/>
			<input type="radio"/>	Poor	<input type="radio"/>
					<input type="radio"/>
11. Other comments	<hr/> <hr/> <hr/>				

ANNEX - IX

Speech by Hon. Mohamed Abu Chiaba, Assistant Minister for Fisheries Development during the official closing of the second KMFRI International Science Conference on Aquatic Resources of Kenya (ARK II) held at the Kenya Wildlife Service Training Institute, Naivasha on 19th November 2010

**The Chairman, KMFRI Board of Management, Prof. Peninah Aloo-Obudho,
Principal – Kenya Wildlife service- Training Institute – Prof. George Owiti,
Members of the KMFRI Board of Management,
Director, KMFRI – Dr. Johnson Kazungu,
District Commissioner, Naivasha District, Nakuru County,
Distinguished invited Guests,
Ladies and Gentlemen**

It is with great pleasure and honour for me to join this Galaxy of distinguished scientists, resource managers and stakeholders at this tail end of your deliberations on very important issues concerning aquatic resources of Kenya. I note with appreciation that for the last four days, you have engaged full gear, through various sessions of the conference, and look forward to the relevant recommendations and products of your work that require immediate uptake and implement action by my Ministry.

As you may be aware, the government is fully committed in ensuring that the living standards and welfare of the common mwananchi is improved. To achieve this, the Government has empowered all its agencies through provision of enabling environment and resources. Further, the Government has encouraged collaboration and consultation with the private sector and other stakeholders and organizations within and outside Kenya.

Ladies and Gentlemen,

I have been briefed on the different topics which have been discussed and acknowledge their diversity. I am indeed very grateful to the organizers for according Lake Naivasha key prominence including round table discussion. Lake Naivasha has been a topical issue and I am grateful to note that you have come up with informed recommendations and indeed you have constituted a taskforce to collaborate with other existing organs to solve the problems on the lake once and for all. My Ministry will do what is within our means to ensure that the process you have just started continues to successful conclusions.

Distinguished scientists, you appreciate the heavy responsibility the Government has in providing services to Wananchi. Measures have been put in place by providing enabling environment especially through the new constitution dispensation which is meant to devolve Government resources down to counties, the Oceans and Fisheries Policy and Bill, and the

upcoming strategy on the National Aquaculture Development for the sustainable development, effective management and appropriate utilization of the National Fisheries and Aquaculture resources. Through these initiatives, my ministry has undertaken to support the Research, Innovations and Technology programs geared towards enabling the Mwananchi make their decent living.

In this regard, ladies and gentlemen, I hasten to comment that, your contribution through research and out of the conference is paramount and the country is looking upon you to provide solutions to attain the required development.

Ladies and Gentlemen,

I appreciate the effort by KMFRI in initiating collaborative efforts with other Government department's organizations and with other stakeholders. I encourage you to maintain this spirit and take this opportunity to acknowledge not all, but among others, KWS, WIOMSA, KCB and Mikoko Pamoja for putting aside financial and in-kind resources to support this conference. I am also encouraged to note the collective contributions individual projects at KMFRI have made towards the success of this conference and wish to assure you that the Ministry will do all it takes in conjunction with relevant departments to ensure that all the recommendations are implemented.

Further, **Ladies and Gentlemen**, I acknowledge the fact that without your participation in these four days, the conference would not have any meaning. I therefore take this opportunity to thank you all for having found time to personally attend this conference. Let me take this opportunity to sincerely thank the key note speakers for your well researched and articulated papers. Indeed, you contributed immensely to the "mood-setting" for the representative sessions that your speeches supersede.

Ladies and Gentlemen, I wish to join you all in thanking the conference organizing committee and KMFRI Management and staff for the efforts you put into organizing this conference and ensuring the flow of events from start to this end. Congratulations for a job well done.

Ladies and Gentlemen, join me in thanking the entire management and staff of Kenya Wildlife Service Training Institute for exemplary service, care and hospitality, we have all enjoyed during those four days. Through the Principal, and on behalf of the Ministry and KMFRI, we extend our sincere gratitude to the Director of KWS for the resources accorded this conference.

With these few remarks, Ladies and Gentlemen, I wish you all safe journey to your various destinations within and outside the country.

It is my pleasure therefore to declare the 2nd KMFRI International Science conference on Aquatic Resources of Kenya (ARK II) officially closed.

THANK YOU.

ANNEX – X

Chairs and Rapporteurs of Sessions

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16 November					
09:30-10:00	OPENING CEREMONY	E. Wakwabi	ewakwabi@kmfri.co.ke	B. Kirui	bkirui@kmfri.co.ke
10:30-11:50	Keynote	B. Kaunda-Arara	b_kaunda@yahoo.com	J. Kairo	jkairo@kmfri.co.ke
11:50-13:30	Fisheries Research & management	Director FD		D. Sigana	dsigana@yahoo.com
14:30-17:50	Fisheries Research & management	E. Yongo	ernyongo@yahoo.com	E. Fondo	efondo@kmfri.co.ke
11:50-13:30	Aquaculture Research & Development	H. Charo	Charo@gmail.com	M. Ngarari	mmukami@kmfri.co.ke
14:30-17:30	Aquaculture Research & Development	C. Ngugi		J. Munguti	jonathanmunguti@hotmail.com
11:50-15:30	Biodiversity & Ecosystem Functions	J. Kairo	jkairo@kmfri.co.ke	G. Ogendi	gmorara2009@gmail.com
15:50-17:50	Biodiversity & Ecosystem Functions	P. Raburu	praburu2002@yahoo.com	J. Mwaluma	jmwaluma@kmfri.co.ke
17 November					
09:00-10:50	Keynote	N. Kitaka	nkitaka@yahoo.com	J.Ojuok	jojuok@yahoo.com
10:50-12:50	Lake Naivasha Presentations	K. Mavuti	kmavuti@uonbi.ac.ke	J. Gichuki	gichukij@yahoo.com
14:00-16:30	Round Table Discussions	J. Bosire	jbosire@kmfri.co.ke	P. Gwada	pgwada@kmfri.co.ke
18 November					
09:00-10:20	Keynote	M. Huxham	m.huxham@napier.ac.uk	C. Odoli	codoli@kmfri.co.ke
10:20-13:40	Biodiversity & Ecosystem Functions	G. Owitti		J. Kamau	jkamau@kmfri.co.ke
14:40-17:30	Limnology and Oceanography	J. Onyari	johnonyari@yahoo.com	D. Mirera	dmirera@kmfri.co.ke
10:20-13:40	Policy and Management	D Masai		J. Ochiewo	jochiewo@kmfri.co.ke
14:40-16:20	Climate Change	N. Muthiga	nmuthiga@wcs.org	J. Karisa	jkarisa@kmfri.co.ke
10:20-13:40	Limnology and Oceanography	J. Kolding	jeppe.kolding@bio.uib.no	V. Wangondu	vwwangondu@yahoo.com
14:40-17:30	Limnology and Oceanography	R. Abila	abilarichard@yahoo.com	G. Okemwa	gokemwa@kmfri.co.ke
19 November					
09:00-10:20	Key note	T. McClanahan	tmcclanahan@wcs.org	B. Kirui	bkirui@kmfri.co.ke
10:50-12:30	Fisheries Research & Management	J. Gichuki	gichukij@yahoo.com	C. Aura	caura@kmfri.co.ke
10:50-12:30	Contemporary Socio-economic Issues	J. Ochiewo	jochiewo@kmfri.co.ke	I. Wanyonyi	innocent_ke@yahoo.com
10:50-12:30	Mikoko Pamoja	J. Kairo	jkairo@kmfri.co.ke	J. Langat	kisigilang@yahoo.com
12:30- 13:15	CLOSING CEREMONY	Director KMFRI	director@kmfri.co.ke	D. Masai	mmmuture@yahoo.co.uk

ANNEX – XI

Members of the National Organizing Committee

1. Dr. Enock Wakwabi – Chairman
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3. Dr. Jared Bosire – Chair, Abstracts Committee
4. Mr. Stephen Mwangi – Chair, Procurement Committee
5. Mr. Patrick Gwada – Chair, Logistics Committee
6. Dr. James Kairo – Chair, Finance Committee
7. Mr. Harrison Onganda – Chair, Publicity Committee
8. Dr. Bernard Kirui – Member, National Organizing Committee
9. Dr. William Ojwang – Member, National Organizing Committee
10. Dr. Melckzedek Osore – Member, National Organizing Committee
11. Mr. Morris Munene – Member, National Organizing Committee
12. Dr. Micheal Nguli – Member, National Organizing Committee
13. Ms. Gladys Okemwa – Member, National Organizing Committee
14. Mr. Abraham Kagwima – Member, Finance Committee
15. Mr. George Morara – Member, Logistic Committee
16. Dr. John Gichuki – Member, Finance Committee
17. Dr. Richard Abila – Member, Finance Committee
18. Ms. Patience Karega – Member, Finance Committee
19. Mr. Mutune Masai – Member, Finance Committee
20. Mr. Hastings Nyangoto – Member, Finance Committee
21. Mr. Gabriel Kitonga – Member, Procurement Committee

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Ms. Priscilla Githui
Mrs. Esther Goga
Mrs. Josephine Jidei
Mr. Christopher Aura
Mr. Cyprian Odoli
Mr. Simon Agembe
Mr. Cosmas Munga
Ms. Lillian Daudi
Ms. Esther Fondo
Mr. Milton Apolo

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Mazera Ndurya