REGIONAL CONFERENCE

Water Stewardship for Sustainable Hydropower

5 – 8 June 2018
Safari Park Hotel, Nairobi

Organised by the
International Water Stewardship Programme
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Acronyms used in this document

AER Aquatic Ecosystem Research Programme
DWRM Directorate of Water Resources Management, Uganda
ERA Electricity Regulatory Authority, Uganda
ESG Environmental, social and governance
GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
ICCA Institute for Climate Change and Adaptation
IHA International Hydropower Association
IUCN International Union for Conservation of Nature
IWaSP International Water Stewardship Programme
IWMI International Water Management Institute
IWRM Integrated Water Resources Management
KTDA Kenya Tea Development Agency
NGOs Non-governmental organisations
PEI Policy Entrepreneurs Incorporated, Nepal
REH Renewable Energy Holdings, South Africa
SDGs Sustainable Development Goals
UNFCCC United Nations Framework Convention on Climate Change
WARMA Water Resources Management Authority, Zambia
WWF World Wide Fund for Nature
The Ministry of Water and Sanitation is mandated to protect, conserve, manage and develop water resources of the country, and among its objectives is to improve the sustainable management and regulation of water resources. This mandate has a clear bearing to sustainable hydropower development in the country. With Kenya classified as a water scarce country, water for the environment and domestic use takes precedence over other water demands, including agriculture and industry. Considering that hydropower is a non-consumptive use, the Ministry deliberately encourages development of multi-purpose dams that factor in hydropower as one of the components. This is more so because water supply pumping schemes incur huge electricity bills, which can be minimised in schemes that have in-built power supply components.

The Water Resources Authority, a semi-autonomous institution of the Ministry, is dedicated to managing and protecting catchment areas, including rehabilitation and conservation of those catchment areas that feed the major hydro-dams of the country. The successful implementation of this mandate will not only ensure steady flows of rivers feeding into the dams (barring any climatic conditions that are nature related), but also limit the volume of siltation in the dams. In this regard, while the operators of these hydro-dams pay levies to the Authority, the latter is obliged to re-invest part of the levies to catchment management to ensure continuous flow of rivers feeding the dams. For example, the most prominent hydropower scheme in the country is the Seven Forks Dam in the Tana River catchment. This is a series of reservoirs on Tana River, which means that if the river dries, then the country loses about 530MW of electricity! Therefore, activities and programmes that re-dress land degradation should be implemented through collaboration with state and non-state actors.

The Authority has embarked on the development of Catchment Basin Planning, whose objective is a holistic planning at basin level. In this regard, the Authority will implement a more proactive and well-coordinated development and management of water, land use and land cover, in order to maximise the resultant economic and social welfare in an equitable manner without comprising the sustainability of vital ecosystems.

In view of climate variability that makes hydropower unreliable (during prolonged drought, the government is shifting to other alternative and expensive sources of electricity generation. But it should be noted here that hydroelectric power provides the much-needed clean/green energy, and therefore measures geared towards catchment management should be put in place for a healthy and sustainable world. Unfortunately, the shift to alternative sources of energy will result to hydropower accounting for only 5% of total installed electricity capacity by 2030.

The hosting of this conference is therefore timely and I hope it will focus on how we can enhance hydropower output to guarantee a healthy and sustainable world.

I conclude by appreciating the International Water Stewardship Programme and GIZ for planning this Regional Conference on Water Stewardship for Sustainable Hydropower.

Joseph W. Irungu, CBS
Principal Secretary, Ministry of Water and Sanitation
Water Stewardship is a promising cooperation model for all industries concerned about water. Simply put, “stewardship” is the management of natural resources through the collaboration of companies, civil society and government. It can help hydropower producers to manage water risks more effectively and can contribute to a more prosperous and sustainable approach to core business activities.

I am delighted that the GIZ-managed International Water Stewardship Programme (IWaSP) is hosting this conference, which is building the bridge between hydropower and water stewardship. Our experience has shown that companies that engage in water stewardship understand better how resources are managed, how they are exposed to water risks, and how other actors plan to manage water in the future. Engaging in a water stewardship partnership creates a perspective on how water risks can be influenced positively. It opens an avenue for pooling resources and knowledge under a common goal — creating water security for all partners. I hope we can inspire hydropower actors to become water stewards.

Since 2013, IWaSP has had a successful track record of mobilising over 100 partners, across nine countries and more than 25 partnerships, in identifying and mitigating water-related risks based on sound socio-economic action plans. Funded jointly by the UK Department for International Development (DfID) and the German Federal Ministry for Economic Cooperation and Development (BMZ), and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the programme has been instrumental in providing improved water security to more than 850,000 people.

André Lammerding
Head of the GIZ International Water Stewardship Programme
## Programme overview

**Tuesday 5 to Friday 8 June 2018**

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<tr>
<td><strong>Pre-conference workshop, full day</strong></td>
<td><strong>Conference, full day</strong></td>
<td><strong>Post-conference workshops, in parallel</strong></td>
<td><strong>Field trip, full day, very early start</strong></td>
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</table>
| Benefit sharing in hydropower projects  
- From compensation and mitigation to ‘payment for ecosystem services’ and benefit sharing  
- Lessons from Nepal  
- Models for the region  
- How to take things forward, including discussions on a proposed follow-on hydropower initiative of GIZ  
**Convenor:** Policy Entrepreneurs Inc., Nepal, IWaSP  
**Target audience:** Hydropower developers and operators, consultants, government agencies in charge of environmental and social safeguards, community-based natural resources management initiatives, international development partners, renewable energy programmes  
**Duration:** One day | Welcome and opening  
Kenya Government, GIZ Country Office / IWaSP  
**Setting the scene**  
Water stewardship in the hydropower context  
**Water resources planning, climate and water risks**  
- Water resources planning in the face of conflicting objectives and increasing water scarcity  
- Climate variability, climate predictions  
- Risk assessment, decision making under risk and uncertainty, mitigation and adaptation, resilience in design  
**Stakeholder engagement, social and environmental safeguards, benefit sharing**  
International practice and experience in the region  
**Catchment management for sustainable operations, case studies**  
- Technical and managerial approaches, experiences in the hydropower context  
- IWaSP Kiwira Partnership, Tanzania  
- others, not IWaSP related  
**Wrap up session**  
The bigger picture of natural resources stewardship  
**Conference dinner**  
For all participants, in a formal setting | IHA sustainability assessment protocol  
**Convenor:** International Hydropower Association (IHA)  
**Target audience:** Hydropower developers and operators, consultants, government agencies in charge of EIA  
**Duration:** Full day | Field trip  
To the Lower Nyamindi Hydropower Project of KTDA Power, Kirinyaga County  
**Convenor:** KTDA Power  
**Target audience:** All participants  
**Logistics:** Safari vehicles, refreshments and lunch at site  
**Duration:** One day |

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| Environmental flows  
- Applicable methodologies and current practice in the region  
- Case studies  
**Convenor:** International Water Management Institute, IWMI, Univ. of Mpumalanga and KZN, South Africa  
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| Climate and water risks  
Climate variability and change, decision scaling, resilient design for hydropower projects  
**Convenors:** University of Nairobi, Aurecon  
**Target audience:** Hydropower developers and operators, consultants, government agencies in charge of renewable energy  
**Duration:** Half day | Field trip  
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Tue, 5 June 2018
Pre-conference workshop on benefit sharing in hydropower projects

THEME

When hydropower development is seen as controversial, it is quite often the perceived uneven distribution of benefits. This emerges from project development that creates friction and development disputes between communities, macro-economic planners and project developers.

How can hydropower projects be designed and implemented so that affected communities derive benefits beyond mere compensation and mitigation? Is there evidence that benefits can be shared fairly and equitably with communities?

Though a variety of interpretations exist, the term ‘benefit sharing’ refers to a new set of programmatic methods to reconcile the uneven incidence of costs and benefits resulting from hydropower development, an attempt to recognise the diverse claims of differently situated stakeholders, and a way of increasing long-term socio-economic impact of hydropower development in the project area. As such, benefit sharing is often presented as ‘a core concept related to implementation of the principles of sustainability’ — a vital and practical method for promoting cooperation, improved stakeholder engagement, and social and spatial equity.

Discussions in this pre-conference workshop shall lead to increased clarity over the concepts of benefit sharing, which will allow for a better understanding of the relationship between the development of hydropower projects and sustainable and inclusive development more generally.

CONVENOR AND SPEAKERS

Convenor: Padmendra Shrestha, Policy Entrepreneurs Inc., PEI, Nepal
Speakers: Padmendra Shrestha, PEI
Hannah Pitts, Natural Capital Coalition
Cristina Diez Santos, IHA
Facilitators: Eric Buhl-Nielsen, PEM Consult
Patrick Onyango, GIZ Water Sector Reform Programme
PROGRAMME

08.00 – 09.30 Registration
09.30 – 09.50 Introduction of participants (Patrick Onyango)
09.50 – 10.00 Setting the scene (Eric Buhl-Nielsen)
  • Compensation and mitigation in the environmental legislation
  • Current practices in the region
10.00 – 10.30 Overview of benefit-sharing practices (Padmendra Shrestha)
  • International definitions
  • Current practices in Nepal
10.30 – 10.45 Discussion on perceptions and current practices and perceptions of benefit sharing in the East African region

10.45 – 11.15 REFRESHMENT BREAK

11.15 – 11.45 Two of the widely used practices of benefit sharing in Nepal (Padmendra Shrestha)
  • Revenue sharing through royalty
  • Equity sharing
11.45 – 12.00 Discussion on current practices and challenges in sharing royalty and equity in local communities in the East African region
12.00 – 12.30 Community development and governance issues around benefit sharing in Nepal (Padmendra Shrestha)
  • Environment-society interactions
  • Decision-making mechanisms
12.30 – 12.45 Discussion on governance issues around benefit sharing in the East African region

12.45 – 14.00 LUNCH BREAK

14.00 – 14.30 How natural capital thinking can strengthen benefit sharing (Hannah Pitts, Natural Capital Coalition)
  • Introduction to natural capital valuation, and approaches like the Natural Capital Protocol
  • How these approaches can help to highlight hidden benefits, identify opportunities, and engage stakeholders
  • Will include relevant case studies from businesses globally
14.30 – 15.00 Benefit-sharing approaches in the hydropower sector (Cristina Diez Santos, IHA)
  • Introduction of IHA work
  • Outline of work being undertaken for the World Bank Group

15.00 – 15.30 REFRESHMENT BREAK

15.30 – 16.15 Panel discussion: Emerging models for benefit sharing in hydropower in the region
  Panellists: Anton-Louis Olivier, REH
  Hamisi Mikate, Ensol Tanzania
  George Owuor, Frontier Energy
  Christina Enders, Conservation International
  Paul Gacheru, Nature Kenya
  Dr Hannah Baleta, WWF Myanmar
  Anne Marie Ran, IWaSP

16.15 – 16.30 Wrap-up and conclusions (Eric Buhl-Nielsen and Patrick Onyango)
Regional conference on water stewardship for sustainable hydropower

**THEME**

Whereas less than one-third of Africa’s feasible hydropower potential has been tapped, the growing need for power is juxtaposed with water scarcity; the need for water resources to be managed sustainably is paramount.

Government and development partner-driven renewable energy promotion programmes are in place or launching, creating dynamic opportunities for Independent Power Producers (IPPs) throughout the East Africa region. There is a need to ensure that these programmes strategically address environmental and social risks associated with scaling up renewable energies. Two principles emerge: to ‘build the right projects at the right spots’ and to ensure ‘inclusiveness’ in all processes.

Against this backdrop, this regional conference on ‘Water stewardship for sustainable hydropower’ shall provide the platform to explore how stewardship approaches can address the pressing challenges and add value to existing models of hydropower development and operation.

**CONVENOR AND FACILITATORS**

Convenors: André Lammerding, Head of GIZ International Water Stewardship Programme, IWaSP
Christoph Mor, Hydropower Advisor, IWaSP

Facilitators: Eric Buhl-Nielsen, PEM Consult
Patrick Onyango, GIZ Water Sector Reform Programme
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<td>09.00 – 09.10</td>
<td>Welcome and opening, setting the scene</td>
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<td>09.10 – 09.20</td>
<td>Welcome, IWaSP (Stefan Opitz, GIZ Country Director)</td>
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<tr>
<td>09.20 – 09.30</td>
<td>Opening (Joseph W. Irungu, CBS, Principal Secretary, Ministry of Water and Sanitation)</td>
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<td>09.30 – 09.40</td>
<td>Setting the scene: Water stewardship in the hydropower context (Christoph Mor, IWaSP)</td>
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<td>- Challenges to hydropower sustainability</td>
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<td>- The stewardship approach: stakeholder engagement and risk assessment, developing the value proposition and business case, joint action through partnerships</td>
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<td>09.40 – 10.10</td>
<td>REFRESHMENT BREAK</td>
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<td>10.10 – 10.30</td>
<td>Water resources planning, climate and water risks</td>
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<td>10.30 – 10.50</td>
<td>Water resources planning in the face of conflicting objectives and increasing water scarcity (Hans Beuster, Aurecon)</td>
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<td>10.50 – 11.10</td>
<td>A view from Myanmar: Exploring system-scale hydropower planning (Dr Hannah Baleta, WWF)</td>
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<td>11.10 – 11.30</td>
<td>The ‘silo’ mentality in project development — hydropower versus farm block developments; the need for integrated planning (Lemmy Namayanga, WARMA Zambia)</td>
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<td>11.30 – 11.50</td>
<td>Climate variability and change in the larger Eastern Africa region (Dr Christopher Oludhe / Prof. Francis Mutua, Univ. of Nairobi)</td>
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<td>11.50 – 12.10</td>
<td>Decision-making under risk and uncertainty (Dr James Cullis, Aurecon)</td>
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<td>12.10 – 12.30</td>
<td>Discussion (Eric Buhl-Nielsen and Patrick Onyango)</td>
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<td>12.30 – 14.00</td>
<td>LUNCH BREAK</td>
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### Wed, 6 June 2018

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<tr>
<th>Time</th>
<th>Session</th>
<th>Panelists</th>
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| 14.00 – 14.20 | **Stakeholder engagement, social and environmental safeguards, benefit sharing**  
Environmental and social safeguards in hydropower in Uganda  
(Peter Kityo, ERA, Uganda)  
• Experiences in implementing international standards in hydropower projects  
• Emerging good practice in Uganda |
| 14.20 – 14.40 | **Benefit-sharing in hydropower projects**  
(Padmendra Shrestha, PEI)  
• International definitions and current practice in Nepal  
• Community development and governance issues  
• Emerging practice in the region |
| 14.40 – 15.00 | **Current trends in the assessment of hydropower sustainability**  
(Frank Faraday, IHA)  
• Current trends in hydropower sustainability  
• Role of the Hydropower Sustainability Assessment Protocol  
• Introduction to climate bond financing and trends within hydropower  
• New tools for sustainability assessment: ESG Gap Analysis Tool |
| 15.00 – 15.20 | **The role of Environmental Flows in sustainable water resource use**  
(Dr Chris Dickens, IWMI / Dr Gordon O’Brien, AER)  
• Balancing water resource use and protection  
• Setting a vision for the protection of water resources and associated objective/target setting  
• Principles of Environmental Flows for sustainable water resource  
• Best practice methods for Environmental Flow determination  
• Getting the balance right and then implementing it |
| 15.20 – 15.40 | **Discussion**  
(Eric Buhl-Nielsen and Patrick Onyango) |
| 15.40 – 16.10 | **REFRESHMENT BREAK** |
| 16.10 – 16.30 | **Catchment management for sustainable operation, stewardship examples**  
Water resources planning and optimal hydropower development: a case for Uganda  
(Dr Callist Tindimugaya, DWRM Uganda)  
• DWRM mandate and role in hydropower developments and operations  
• Challenges and opportunities to improve this interface  
• Experiences |
| 16.30 – 16.50 | **The watershed/landscape restoration approach in sustainable energy supply**  
(Charles Karangwa, IUCN)  
• Hydropower, fuelwood, etc. |
| 16.50 – 17.10 | **Small hydropower development in the Kiwira Catchment, Tanzania**  
(Hamisi Mikate, Ensol Tanzania Ltd and Fridtjof Behnse, IWaSP)  
• The parties and their interests, the key challenges  
• Applying the stewardship approach |
| 17.10 – 17.30 | **The Zengamina Small Hydropower Project**  
(Dan Rea, Zengamina Power Company, Zambia)  
• How it all started, a family trust  
• The project  
• Current challenges and future plans |
| 17.30 – 17.50 | **Discussion**  
(Eric Buhl-Nielsen and Patrick Onyango) |
| 17.50 – 18.00 | **Wrap up session**  
Adopting stewardship approaches in the hydropower industry — the way forward  
(André Lammerding, IWaSP) |
Thu, 7 June 2018
Post-conference workshop 1 on the
Hydropower Sustainability Assessment Protocol

THEME
The Hydropower Sustainability Assessment Protocol is recognised internationally as the primary tool for evaluating sustainability performance in hydropower. Since its launch in 2011, the Protocol has been applied at almost 40 sites in both developed and developing countries. It offers a framework for assessing a project at different stages of its development — from early stage to preparation, implementation and operation — against more than 20 sustainability topics, including siting and design, finance and safety, as well as impacts on biodiversity and local communities, among other topics such as basic good practice and proven best practice.

The Protocol has now been expanded to cover a new climate topic to assess a project’s carbon footprint and resilience to climate change. In addition, a more targeted, cost-effective tool, based on the Protocol, has been developed to enable a project to be assessed against basic good practice across key environmental, social and governance criteria. This recognises increasing demands from developers and international investors, who have requested a simplified screening mechanism to gauge eligibility for green financing, such as through climate bonds.

CONVENOR AND SPEAKERS
Convenor: Frank Faraday, International Hydropower Association, IHA
Speakers: Frank Faraday, IHA
João Costa, IHA
Facilitator: Dan Marlone, Hydro Power Association of Uganda
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<td>09.00 – 09.15</td>
<td>Introduction (Dan Marlone)</td>
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<td>09.15 – 09.35</td>
<td>Setting the scene (Frank Faraday)</td>
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<td>• Background to developing the Protocol</td>
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<td>• World Commission on Dams</td>
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<td>• Hydropower Sustainability Forum</td>
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<td>09.35 – 10.20</td>
<td>Introduction to the Protocol (Frank Faraday)</td>
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<td>• Structure (topics, scoring statements, criteria)</td>
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<td>• Good practice vs. best practice</td>
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<td>• Governance</td>
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<td>• Council Chambers and stakeholder engagement</td>
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<td>10.20 – 10.30</td>
<td>Questions and answers, discussion (Dan Marlone)</td>
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<td>10.30 – 11.00</td>
<td>REFRESHMENT BREAK</td>
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<tr>
<td>11.00 – 11.50</td>
<td>The Protocol in practice (João Costa)</td>
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<td>• Basic auditing principles</td>
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<td>• Interview techniques</td>
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<td>• Handling evidence</td>
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<td>• How to record evidence</td>
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<td>• Interpreting scoring statements</td>
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<td>11.50 – 12.00</td>
<td>Questions and answers, discussion (Dan Marlone)</td>
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<td>12.00 – 13.30</td>
<td>LUNCH BREAK</td>
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<tr>
<td>13.30 – 13.50</td>
<td>The Protocol and climate change (João Costa)</td>
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<td>• Expanded Protocol to include new topic</td>
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<td>• Threshold values for reservoir emissions</td>
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<td>• Introduction to the G-Res tool</td>
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<td>• Climate resilience aspects</td>
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<td>13.50 – 14.00</td>
<td>Questions and answers, discussion (Dan Marlone)</td>
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<td>14.00 – 14.20</td>
<td>New Protocol tools (Frank Faraday)</td>
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<td>• Background to development of Protocol derivative products</td>
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<td>14.30 – 15.00</td>
<td>REFRESHMENT BREAK</td>
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<td>15.00 – 15.40</td>
<td>Value of the Protocol (João Costa and Frank Faraday)</td>
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<tr>
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<td>• Examples of how the Protocol can be used</td>
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<td>• Compliance with international financial institutions’ safeguards (e.g. the World Bank)</td>
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<td>• Case Studies: Where the Protocol has had a direct bearing on good practice uptake</td>
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<td>15.40 – 16.10</td>
<td>Discussion on sustainable hydropower in the regional context, wrap-up and conclusions (Dan Marlone)</td>
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Post-conference workshop 2 on environmental flows

THEME
Over the past decades, considerable efforts have gone into understanding the issues related to rivers, their flow-ecology relationships, human impacts on the ecosystem services and above all the question: ‘How much water does a river need?’

Environmental flows (e-flows) describe the quantity, timing and quality of water flows required to sustain river, wetlands and estuarine ecosystems, as well as the human livelihoods and well-being that depend on these ecosystems. Now included as part of the Sustainable Development Goals (SDGs) of the UN, it is imperative to include this concept in water resources management procedures, which ultimately filters down to the management of dams and the ability to use the water resource.

This workshop will introduce participants to environmental flows and will consider the most relevant aspects of including environmental flows into water resources management. It will also include the different approaches to assessment in a way that will enable participants to make informed decisions on the most appropriate methods.

CONVENORS AND SPEAKERS
Convenors: Dr Chris Dickens, International Water Management Institute, IMWI, Johannesburg, South Africa
Dr Gordon O’Brien, Aquatic Ecosystems Research Programme, AER, Universities of Mpumalanga and KwaZulu-Natal, South Africa
Speakers: Dr Chris Dickens, IWMI
Dr Gordon O’Brien, AER
William Rex, World Bank
Facilitator: Eric Buhl-Nielsen, PEM Consult

PROGRAMME
09.00 – 09.15 Introduction (Eric Buhl-Nielsen)
09.15 – 09.45 • The UN Agenda on Sustainable Development Goals and environmental flows — country targets
09.45 – 10.15 • Setting a vision for the protection of water resources and associated objective/target setting per river
• Balancing water resource use and protection
10.15 – 10.45 REFRESHMENT BREAK
10.45 – 11.15 Principles of environmental flows and options for assessment
11.15 – 12.45 Examples of different methods
• Examples of application
• DRIFT
• BBM
• Probflo
12.45 – 14.00 LUNCH BREAK
14.00 – 14.30 Best practice — From the quick and dirty to the comprehensive, the method fitting the need
14.30 – 15.00 Good practices for managing environmental flows — introduction to latest World Bank Group guidance (William Rex, World Bank)
15.00 – 15.30 Management rules for implementing environmental flows
15.30 – 16.00 REFRESHMENT BREAK
Post-conference workshop 3 on climate and water risks

THEME
Extreme weather events and changes in hydrological patterns can be expected in a world altered by climate change. Hydropower systems are characterised by their longevity. Traditionally, they are designed on the basis of historical hydrological data. Planning future hydropower systems with a long-term, climate-resilient perspective will ensure that future generations inherit infrastructure that will not be compromised by climate change.

CONVENORS AND SPEAKERS
Convenors: Prof. Francis Mutua, University of Nairobi
Prof. Daniel Olago, University of Nairobi
Dr James Cullis, Aurecon, Cape Town, South Africa
Speakers: Prof. Francis Mutua, University of Nairobi
Dr Christopher Oludhe, University of Nairobi
Dr James Cullis, Aurecon
Hannah Pitts, Natural Capital Coalition
Facilitator: Patrick Onyango, GIZ WSRP

PROGRAMME
09.00 – 09.15 Introductions (Patrick Onyango)
09.15 – 09.45 Setting the scene (Dr James Cullis)
• Enhanced climate resilience for water infrastructure in Africa
• Climate change risks, mitigation and adaptation options for hydropower
• Decision making under climate change and other uncertainty
09.45 – 10.15 Climate variability and change in the larger Eastern Africa region (Dr Christopher Oludhe, University of Nairobi)
• Differences between weather, climate, climate variability and climate change
• Factors influencing/affecting climate in the region (climate drivers)
• Regional climate prediction
10.15 – 10.30 Questions and answers, discussion (Patrick Onyango)
10.30 – 11.00 REFRESHMENT BREAK
11.00 – 11.20 Climate variability/change and the associated water risks (Prof. Francis Mutua, University of Nairobi)
• Water risks arising from climate variability and change
• Climate scenarios and their uncertainty, implications for water resources
11.20 – 11.40 Using natural capital thinking to assess risks and opportunities (Hannah Pitts, Natural Capital Coalition)
• Will recap on basic natural capital concepts, and look at how these can be used to inform risk management
• Consider how other businesses have used natural capital information to manage risks more effectively, and even turn them into opportunities
11.40 – 12.00 Questions and answers, discussion (Patrick Onyango)
12.00 – 13.30 LUNCH BREAK

Afternoon
Participants may join the afternoon session of the workshop on the Hydropower Sustainability Assessment Protocol, which also deals with climate change risks
Field trip to the Lower Nyamindi Hydropower Project of KTDA Power

PROJECT DESCRIPTION
The Kenya Tea Development Agency, KTDA, currently develops a larger portfolio of small hydropower schemes, which shall supply energy to the tea factories in their proximity. Among this portfolio is the Lower Nyamindi Hydropower Project. It is located in Kirinyaga County, central Kenya near the town of Kerugoya.

With its headwaters originating from Mount Kenya, the Nyamindi is part of the Upper Tana catchment. Whereas the upper catchment covers evergreen, high forest ecosystems, the lower catchment is almost fully under cultivation.

The hydropower project follows a conventional run-of-river layout, including intake, settling basin, headrace canal, forebay, penstock and powerhouse with tailrace. Construction is now nearing completion. Salient features of the project include:

- **Installed capacity**: 1.8MW
- **Design flow**: 4.65m/s (36% flow exceedance probability)
- **Net head**: 44m
- **Weir**: 20m long, 3m high concrete
- **Settling basin**: Reinforced concrete double chambered, each 30m x 6m
- **Headrace canal**: 2,157m long
- **Penstock**: 175m long, 1800mm diameter, 10mm thick steel pipe
- **Powerhouse**: 18m x 12m size reinforced concrete framed structure
- **Transformer**: 2.5 MVA step-up transformer
- **Transmission line**: 34km long 33kV line connection to KPLC’s Kutus 132kV substation, and the Kimunya and Thumaita tea factories
- **Annual energy**: 10.39GWh
- **Project cost**: USD 8.28 million
- **Annual gross revenue**: USD 1.42 million

**Convenor**: James Wainaina Ndung’u, Project Manager at Site, KTDA Power

PROGRAMME

**06.00**  
Departure from Nairobi, drive to Kirinyaga County

**09.30 – 10.00**  
Welcome at the site office and briefing (James Wainaina Ndung’u, KTDA Power)  
- An introduction to KTDA’s role in supporting smallholder tea growers in Kenya; the inclusive business model, small farmers are the shareholders of the tea factories  
- KTDA’s small hydropower programme, its impressive performance during recent years, as well as co-funding arrangements through the World Bank’s Carbon Initiative for Development and the UNFCCC’s Clean Development Mechanism Programme  
- A brief history of the construction of the Lower Nyamindi Hydropower Project

**10.00 – 11.00**  
Technical tour through the construction site

**11.00 – 12.00**  
Drive to Mount Kenya Forest

**12.30 – 14.30**  
**LUNCH AT THE CASTLE FOREST LODGE**

**14.30 – 18.00**  
Return to Nairobi
Hannah Baleta
Dr Hannah Baleta is currently based in Yangon, Myanmar, as part of the WWF Freshwater Team. She is coordinating the “River in the Economy” project, which involves facilitating workshops across the basin to collect perspectives on risk, opportunities and benefit sharing in the future of the basin. Previously she worked from Cape Town, South Africa for Pegasys, a consultancy. During this time she travelled extensively across Southern and East Africa, working on climate and water strategy and policy, for both governments and also for the private sector. She has a PhD on the concept of water risks, and how the public and private sector experience and evaluate this shared risk differently.

Hans Beuster
Hans is a water resources engineer with 30 years of experience in the fields of catchment management strategies, hydrology, river hydraulics, environmental flow assessments and feasibility studies. Other areas of experience include the development of water resource management regulations and IWRM decision support. He is currently based in Kenya as team leader on a Ministry of Water and Sanitation and Water Resources Authority project to strengthen water resources management and planning. He has worked on public and private sector projects in southern, eastern and northern Africa, and in Pakistan and The Netherlands.

Eric Buhl-Nielsen
Dr Eric Buhl-Nielsen is an experienced facilitator with long experience in the water and energy sectors. He has supported the International Water Stewardship Programme since 2011 and was recently team leader for the global evaluation of EU support to the sustainable energy sector (2011-2016) and also the global evaluation of EU support to environment, energy and climate (2007-2013). He has facilitated and supported regional learning events, conferences and workshops in many countries.

João Costa
João is the Sustainability Specialist of the International Hydropower Association. He works primarily on the development and implementation of the Hydropower Sustainability Assessment Protocol — a means for assessing a project’s sustainability across a range of social, environmental, technical and economic criteria. Additionally, his work focuses on sharing knowledge about sustainable hydropower development, through training and capacity building projects worldwide. A civil engineer by training, João worked in numerous international projects before joining IHA, including a hydropower plant in Portugal, and a range of construction schemes in the UK and the Middle East. He earned an MSc in Civil Engineering from Instituto Superior Tecnico in Portugal and furthered his studies with an MPhil in Engineering for Sustainable Development from the University of Cambridge, UK. There, he focused his research on hydropower, resilient water systems and the complexities of sustainable energy provision.
James Cullis

Dr James Cullis has a PhD in Civil and Environmental Engineering from the University of Colorado, an MSc in Environmental Change and Management, and an MA in Politics, Philosophy and Economics from Oxford University. He is a Technical Director in the water group of Aurecon in Cape Town and the Global Service Group Leader for Water for Aurecon. James has a broad range of experience in water resources, engineering and climate change related studies, particularly in Africa, including water resources planning, hydrology and hydrological modelling, climate change risk, impacts and adaptation, infrastructure feasibility studies and preliminary design of infrastructure. He is particularly interested in water security and climate resilience in Africa, the water-energy food nexus, environmental flow requirements, and realising the true economic value of water. James has authored a number of research papers on water, environmental and climate change related topics with experience in South Africa, the UK, USA and Antarctica. He is also a research associate of the African Climate and Development Initiative (ACDI) at the University of Cape Town.

Chris Dickens

Dr Chris Dickens is the principal researcher and head of the IMWI Southern Africa office. He is an aquatic ecologist with 30 years’ experience working in three main areas — aquatic ecosystem health, water resource protection, including environmental water requirements and resource quality objectives, and water resource management and governance. During his 30-year career, he has worked in the water management industry and for national and international water research agencies and has carried out a wide range of projects during this time. Most recently he was lead author of the indicator method for the SDG Target 6.6 on water-related ecosystems. Besides this, he has done work on environmental water requirements (e-flows) for rivers including the Nile, the Inner Niger Delta, rivers in Lesotho, Tanzania and Kenya and in his home country, South Africa. He has drafted national policy for determination of Resource Quality Objectives and also for management of environmental flows. He has a long history in river health management having designed both methods and monitoring programmes for various countries. He has also worked on various projects considering IWRM and INRM (integrated natural resources management) in Africa as a whole.

Cristina Diez Santos

Cristina Diez Santos is a water resources engineer and hydropower analyst at the International Hydropower Association (IHA). Her work focuses on building and sharing knowledge on sustainable hydropower development. In particular, Cristina works to disseminate knowledge on different river basin planning approaches and foster improved cooperation between decision makers, hydropower developers, research groups and environmental organisations. Moreover, Cristina is working to provide a framework for collecting evidence on the power and non-power benefits of hydropower. As a hydraulic engineer and water resources specialist, Cristina has hands-on experience in climate-society-environment interactions. Particularly, she has experience in the hydropower development in the Zambezi River basin, evaluating and comparing the impacts of national development plans under future climate scenarios.

Frank Faraday

Frank Faraday is Sustainability Programme Manager for the International Hydropower Association (IHA). Frank’s work focuses on encouraging the uptake of good international industry practice in sustainable hydropower and on promoting the Hydropower Sustainability Assessment Protocol and the new Environmental, Social and Governance Gap Analysis Tool to a wider audience of hydropower practitioners, in particular in developing countries. Frank has delivered training on the Protocol in countries as diverse as Costa Rica, Indonesia and Myanmar to both government and the private sector. With a background in energy policy, Frank has previously worked in a variety of international organisations on the development of environmental standards and regulation, energy interconnection and energy efficiency.

Charles Karangwa

Charles Karangwa is a sustainable development and environmental policy professional with 18 years of experience from a range of institutions including government, research institutions, international NGOs and UN agencies across Africa and Southeast Asia. He currently works for the International Union for Conservation of Nature (IUCN) in the capacity of regional coordinator for the Forest Landscape Restoration Unit in the Eastern and Southern Africa region. He has led landscape restoration opportunities assessment and programme development in Ethiopia, Malawi, Mozambique, Kenya, Uganda and Rwanda and has a set of expertise in landscapes management and planning, climate change adaptation and resilience strategies. Charles holds an MSc in Poverty Reduction, Policy and Practices, with focus on environmental policies, from the University of London (2015) and an MA in International Development Studies from the University of Rwanda (2010).
Peter Kityo
Peter Kityo holds a Postgraduate Diploma in Environmental Management from the University of London, UK and an MSc in Natural Resources Management from the University of Twente in The Netherlands. He has 20 years of experience in environmental and natural resources management in Uganda, of which 10 years were gained in the electricity/energy sector. Peter is the Environmental Specialist of the Electricity Regulatory Authority of Uganda.

Hamisi Mikate
Hamisi Saidi Mikate is the managing director and founder of Ensol Tanzania Limited and director of Bwelui Co. Limited, a special purpose vehicle for developing a hydropower scheme. He is an electrical engineer by profession, holding a postgraduate Diploma in Electrical Power Engineering from the University of Dar es Salaam and a Master of Engineering in Maintenance Management from the Dar es Salaam Institute of Technology, and has over 17 years’ experience in renewable energy. In December 2015 Hamisi received the ‘Africa Social Innovation Leadership Award’ in Mauritius. Hamisi Mikate was a member of the Practitioners’ Dialogue on Climate Investments (PDCI) in 2015-2016 for developing a solution on ‘Creating markets for off-and mini-grid renewable energy solutions’. He is a founding member and a member of the Executive Committee of the Tanzania Renewable Association (TAREA) and also a member of the Steering Committee of the Tanzania Renewable Energy Incubator (TAREBI), and serves as a member of the Solar Power Technical Committee of the Tanzania Bureau of Standards.

Lemmy Namayanga
Lemmy N. Namayanga is a natural resource scientist with a knack for detail. He has 20 years of work experience in climate change impacts, environmental impact assessments, satellite hydrology, project management and enforcement and legislation/regulations. Namayanga has also been instrumental at international level participating in various nature protection-based activities. He has been working with the Zambian Water Resources Management Authority, WARMA, for the past four years offering leadership and strategic development of this relatively new institution. Being a visionary, Namayanga is also a very determined character: a graduate of the University of Zambia, the International Institute for Geo-Information Science and Earth Observation, ITC, The Netherlands, the Zambia Institute for Advanced Legal Education, ZIALE, and the Nyenrode Business Universiteit of The Netherlands.

Gordon O’Brien
Dr Gordon Craig O’Brien is an established aquatic ecologist specialising in fisheries research, ecological risk assessments, ichthyology, environmental flow assessments, aquaculture, eco-toxicology and water resource management. He has been practising as a scientist since 2004. His career vision is to contribute to evidence-based research ecosystems and their response to multiple stressor for the sustainable balance between the use and protection of water resources on meaningful spatial scales. His scientific profile includes the publication of books, book chapters and peer-reviewed scientific papers that address the development and application of regional-scale ecological risk assessment methodologies, fisheries research, environmental flow assessments (e-flow) management tools and frameworks, eco-toxicology and general aquatic ecology. Some noticeable products of his research include the characterisation and contribution to fisheries management across Africa and the development of PROBFLO, a holistic, ecological risk-based e-flow assessment method which is being implemented on large spatial scales locally and internationally. Gordon has also developed the FISHTRAC water quality, quantity and fish behavioural response system to evaluate the ecological response of multiple stressors to aquatic ecosystems in real-time, remotely. Gordon is a Senior Lecturer of the School of Biology and Environmental Science of the University of Mpumalanga and the Programme Leader of the Aquatic Ecosystem Research Programme. He has established collaborations with scientists across Africa, Asia, Europe, Australia, United Kingdom and the United States of America, working with these international experts on various projects and programmes.

Anton-Louis Olivier
Anton-Louis Olivier is CEO of the REH Group of companies, which comprises Renewable Energy Holdings (Pty) Ltd, REH Project Development (Pty) Ltd, REH Operations and Maintenance (Pty) Ltd and a number of special purpose vehicle companies including three operational hydropower plants. Qualified in mechanical engineering and with a postgraduate degree in economics, he has worked in the public sector as well as in private sector consulting and as project manager with the United Nations Environment Programme in Denmark. After establishing an energy project development company in The Netherlands in 2000 he also opened its offices in South Africa. He established REH as a hydropower developer in South Africa in 2006. The REH group has since grown to the dominant developer, owner and operator of small hydropower plants in South Africa and has expanded to Zambia. In 2017 he was awarded the International Hydropower Association’s (IHA) Mosonyi Award for Excellence in Hydropower and was made an Honorary Life member of the IHA. Anton-Louis is based in Cape Town, South Africa.
About the speakers

Patrick Onyango
Paul Patrick Onyango has a BSc from Hannover, Germany in Civil and Hydraulics Engineering. He is a Senior Technical Advisor within the German Development Cooperation in Kenya, under the GIZ Water Sector Reform Programme, based at the Ministry of Water and Sanitation in Nairobi. He is a member of the German Association for Water, Wastewater and Waste (DWA). He has over 20 years working experience with GIZ in Kenya and East Africa working in different capacities. He was the Project Manager for the EU-GIZ-SIDA EcoSan Promotion Project, which piloted EcoSan under the Ministry of Water and Irrigation from 2007-2010. He is currently the Component Manager for Policy and Sector Reforms under the GIZ Water Sector Reform Programme.

Hannah Pitts
Hannah Pitts is relationships director at the Natural Capital Coalition, working to coordinate the Coalition’s growing network. She was part of the team which led the development of the Natural Capital Protocol at the World Business Council for Sustainable Development (WBCSD). She also led the technical development of the Natural Capital Protocol Toolkit in 2016 and has previous experience as a sustainability reporting analyst. Hannah has qualifications in Environmental Geography and Globalisation, Business and Sustainable Development, and has an Individual Professional Award in Environmental Valuation Techniques. She currently lives in Dar es Salaam.

Dan Rea
Dan Rea is a civil engineer. He was the project manager of the Zengamina hydro project. He is a founding member and current chairperson of the North West Zambia Development Trust. Dan was born and bred in Zambia, with roots in the North West Province after his great-grandfather came out in 1911 as a missionary to work with Dr Walter Fisher. Dan was educated in Zambia, UK and Canada and has worked in Zambia, UK and Dubai. He spent a year living in a tent beside the Zambezi as civil engineer on the hydro. He is a Fellow of the Royal Geographic Society and the CEO of Zengamina Power Limited.

William Rex
William Rex is a lead water resource specialist at the World Bank and the programme manager of the Cooperation in International Waters in Africa programme. Prior to focusing on transboundary waters, William was the World Bank’s global lead on hydropower and dams, responsible for promoting the best technical approaches for the World Bank’s engagement on dams and hydropower around the world. Between 2006 and 2012, William was based in Laos, leading the team supporting the 1,080MW Nam Theun 2 hydropower project as well as a technical assistance programme focused on hydropower. He is currently based in Nairobi, supporting transboundary waters cooperation across sub-Saharan Africa.

Padmendra Shrestha
Padmendra Shrestha is the Director of Practice at Policy Entrepreneurs Inc. (PEI), a Nepal-based development company. He primarily works at an intersection between infrastructure development, local communities and inclusive economic growth. He has worked extensively on benefit sharing mechanisms, addressing resource-based disputes, and issues of compensation in hydropower projects in Nepal. He is currently the team leader for a study on the participation of project-affected communities in equity sharing (also called local shares) of hydropower projects in Nepal. He has more than 10 years of experience working in the government, non-profit organisations and the private sector in Nepal and the USA. He is a graduate of Urban and Regional Planning from the East-West Center and the University of Hawaii.

Callist Tindimugaya
Dr Callist Tindimugaya is a water resources specialist working with the Ministry of Water and Environment in Uganda. He is the Head of the Department for Water Resources Planning and Regulation with overall responsibility for ensuring sustainable and equitable planning, allocation and utilisation of water resources. Dr Tindimugaya has been key in promoting climate change adaptation through the framework for catchment-based integrated water resources management, which is being implemented through catchment management plans.

James Wainaina Ndung’u
James Wainaina is a civil and structural engineer, working as a Projects Engineer with KTDA Power. For the last five years, he has been involved in KTDA’s small hydropower development initiative and has been undertaking feasibility studies, designs, contracts management and the supervision of works. James is currently attached to the Lower Nyamindi Small Hydropower Project, supervising the works of the EPC contractor.
Aurecon

Aurecon is a global engineering and infrastructure advisory firm with over 85 years of experience in water resources planning and the development of dams, hydropower, water and wastewater treatment plants, and other water-related infrastructure in Africa that is critical to ensuring long-term sustainable development and resilience to climate change impacts.

Aquatic Ecosystem Research Programme, Universities of Mpumalanga and KwaZulu-Natal, South Africa

The Aquatic Ecosystem Research Programme (AER) is an applied research programme of the University of Mpumalanga, University of KwaZulu-Natal and Rivers of Life Aquatic Health Services CC. The AER is dedicated to the development of inland scientific aquatic ecology research through formal research outputs and postgraduate student training.

AER boasts four areas of specialisation including: (1) Water Resource Protection (including ecological risk assessments, e-flow studies, freshwater & estuary monitoring), (2) Biodiversity & Conservation (including fauna and flora population and community research, conservation and ecological indicator research), (3) Fisheries Research (including aquaculture, fish behavioural ecology research, fish community research and subsistence fisheries) and (4) Capacity Development and Training (including postgraduate research training, education and awareness programmes).

AER is based in South Africa and is managed by Dr Gordon O’Brien and Ms Linda Hulley. Currently, 14 researchers are members of the programme. AER has support from specialist scientists and administration and project management from the School of Biology and Environmental Science (UMP) and the College of Agriculture, Engineering and Science (UKZN). AER is a member of the Centre for Water Resources Research (UKZN). AER trains postgraduate students and undertakes applied research projects in South Africa and internationally with a host of collaborators, stakeholders and clients.

International Hydropower Association, IHA

The International Hydropower Association is a non-profit membership organisation committed to advancing sustainable hydropower. Established in 1995 under the auspices of UNESCO, IHA’s membership includes more than 100 organisations as well as individual members.

Our mission is to “advance sustainable hydropower by building and sharing knowledge on its role in renewable energy systems, responsible freshwater management and climate change solutions”. We achieve this through sector monitoring, advancing strategies that strengthen performance, and building an open, innovative and trusted platform for knowledge.

IHA is a champion of international good practices and continuous improvement. We support project assessments and training as the management body for the Hydropower Sustainability Assessment Protocol, an internationally recognised tool for assessing performance against environmental, social, technical and economic criteria.

Our knowledge-building programmes increase awareness of hydropower’s value to clean energy systems and sustainable development, and promote collaborative, adaptive approaches to river basin development and regional interconnections.

We also provide practical, technical advice and support to members on technical issues such as on operations and maintenance, modernisation and sediment management, and have developed tools for dealing with new challenges such as assessing reservoir carbon emissions and building climate resilience.

Recognising that investment in hydropower is essential if the world is to meet global climate targets, we are working with partners to agree on eligibility criteria for green bond financing, and promoting a new preparation facility model to support sustainable hydropower development.
**International Water Management Institute, IWMI**

IWMI is an international non-profit, applied research organisation focusing on the sustainable use of water and land resources in developing countries, with headquarters in Sri Lanka and regional offices across Asia, Africa and the Middle East and Northern Africa (MENA) region. IWMI is a member of the CGIAR system of international agricultural research centres. IWMI’s overall mission is to provide evidence-based solutions to sustainably manage water and land resources. IWMI is recognised as a global centre of excellence in water resources and irrigation management, receiving the Stockholm Water Award in 2012. IWMI leads the CGIAR Research Program on Water, Land and Ecosystems (WLE) in collaboration with 12 other partners.

**Kenya Tea Development Agency, KTDA**

Kenya is the leading producer of tea in Africa. The vast majority of tea is grown on small farms. The Kenya Tea Development Agency Holdings, KTDA, provides comprehensive services to small tea farmers such as agricultural extension, and the processing and marketing of tea.

KTDA tea farmers account for over 60% of tea produced in Kenya. In total, more than 565,000 small tea farmers who cultivate over 100,000 hectares in prime tea-growing areas are KTDA shareholders.

KTDA has seven subsidiaries, including the KTDA Management Services, which oversees 54 companies that collectively own 65 tea-processing factories in which small farmers are shareholders, and KTDA Power, set up to invest in the renewable energy sector and manage small hydropower projects for tea factory companies. The subsidiaries are investments on behalf of farmers. Dividends declared from profits made by these subsidiaries are paid to tea factories companies through KTDA Holdings. The factories, in turn, pay dividends to farmers.

The Rainforest Alliance has certified 54 KTDA tea factories in sustainable agriculture practices; the Fairtrade Foundation has Fair Trade-certified 11 factories. Sustainable practices have enabled farmers to increase yields by 36% on average and receive premiums from buyers of Rainforest Alliance certified teas.

**University of Nairobi, Kenya, Department of Meteorology, and Institute for Climate Change and Adaptation**

The Department of Meteorology located in the College of Biological and Physical Sciences of the University of Nairobi was established in 1964. Since its inception, the Department has played a key role of training many of the meteorological personnel now manning the national meteorological and hydrological services of many of the African countries. The Department offers a wide range of academic programmes at both undergraduate and postgraduate level.

The Department of Meteorology has academic staff undertaking research and teaching in various disciplines such as dynamical meteorology, physical meteorology, tropical meteorology, hydro-meteorology, agro-meteorology, marine meteorology, aeronautical meteorology, renewable energy, environmental pollution, climate change, and urban and building climatology, among other subjects.

The Institute for Climate Change and Adaptation, ICCA, was established in 2011 with the mission of building human capacity necessary to address the unique climate change and adaptation needs of vulnerable communities through teaching, action-oriented research, development of innovative technologies and community participation. ICCA also provides expert advice for national and regional policy formulation and implementation.
ICCA has a diverse and dedicated team of experts and researchers drawn from across the University of Nairobi, with the capacity to deal with climate change and adaptation issues. ICCA offers formal training on climate change science and adaptation at postgraduate level (masters and doctorate), professional short courses for various climate change and adaptation actors and stakeholders in the public and private sectors and NGOs, climate change and adaptation research and knowledge exchange, action-oriented community outreach programmes for implementation of practical climate change and adaptation options, and policy advice on climate change and adaptation. ICCA collaborates with the University of Oxford in the ‘REACH: Improving Water Security for the Poor’ research programme sponsored by the UK Department for International Development (DfID).

Policy Entrepreneurs Inc., PEI
Policy Entrepreneurs Incorporated, PEI, is a Nepal-based development company engaged in examining public problems, assessing policy alternatives, and identifying policy solutions in areas of natural resource management, governance and economic growth. PEI focuses on promoting informed and inclusive platforms for policy dialogues with individuals and institutions across the political spectrum, including citizens, policy experts, interest groups, development partners, political parties and government agencies.
The International Water Stewardship Programme is funded by the Governments of Germany and the UK. The programme forges partnerships between the private sector, community groups and concerned government agencies to overcome water risks. The private sector industries we cooperate with include agriculture, food and beverage, textile and manufacturing. The partnerships are often centred on water quality issues in urban and peri-urban settings, as well as catchment management initiatives in rural settings. Our work with hydropower developers and operators typically focuses on stakeholder engagement, water allocation issues, catchment management, and social and environmental safeguard issues.