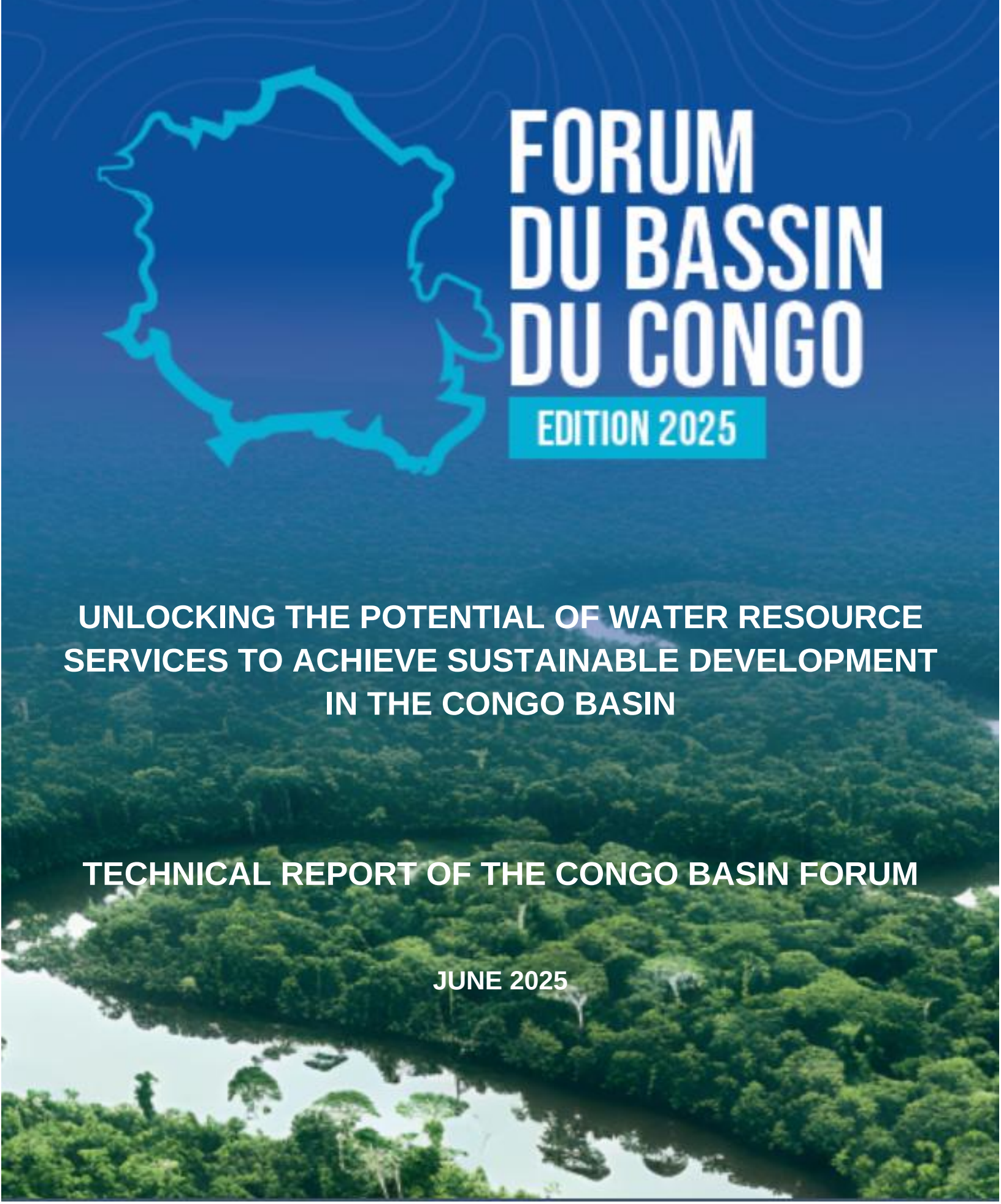

FORUM DU BASSIN DU CONGO

EDITION 2025

UNLOCKING THE POTENTIAL OF WATER RESOURCE SERVICES TO ACHIEVE SUSTAINABLE DEVELOPMENT IN THE CONGO BASIN

TECHNICAL REPORT OF THE CONGO BASIN FORUM

JUNE 2025

ECOLE REGIONALE DE L'EAU

CRREBaC Centre de Recherche en Ressources en Eau du Bassin du Congo

UNIVERSITE DE KINSHASA

The Congo Basin Forum is a biannual event organized by the Congo Basin Water Resources Research Center (CRREBaC) and the Regional School of Water (ERE) of the University of Kinshasa, DRC, focusing on the water resources of the Congo Basin.

The mission of CRREBaC is to contribute to the management and sustainable development of water resources in Congo Basin through research that provides scientifically acceptable information and viable solutions to emerging water resource issues. This mission is accomplished through research programs that promote technology transfer; the generation, dissemination, and application of results; access to interdisciplinary expertise; and the emergence of scientific and technical capacities.

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The videos can be viewed from our website:

1. https://www.youtube.com/live/MpOyLyTHIt0 (opening session)
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Executive Summary

The Congo Basin ecosystems (river system, tropical forests, wetlands, peatlands, and their biodiversity) are highly interconnected and form an integrated ecological system that directly supports the livelihoods of over 100 million people, and indirectly over 300 million people in different parts of the African continent. These ecosystems and diverse resources coexist with less developed economies and poverty. Achieving sustainable development and inclusive growth in the Congo Basin would be significantly compromised if its natural resources are not managed and used in a sustainable, integrated, and efficient manner. As the Congo Basin countries strive to improve political, economic, and social stability, as well as industrial development, the need for water security will become increasingly important. **If this aspect is neglected, there is a risk of conflicts.** It is therefore important to invest in scientific research and technological innovation to promote the emergence of a sustainable development model based on the balance between conservation and optimal exploitation of natural resources for the socio-economic well-being and resilience of communities in the Congo Basin.

The second edition of the Congo Basin Forum took place from June 10 to 13, 2025 in Kinshasa, DRC, around the central theme: "**Unlocking the potential of water resource services to achieve sustainable development in the Congo Basin.**" Its aim was to provide a framework for knowledge and experience sharing between major stakeholders in the water resources in the Congo Basin, including researchers, decision-makers, managers, users and investors, with a view to stimulating the emergence of a sustainable development model based on the management of water resource services in the Congo Basin.

Over the four days, 843 participants from Congo Basin member countries, Africa, and around the world participated in the activities of this second edition of the Congo Basin Forum. These participants included researchers and scientists (50%), students (15%), civil society organizations involved in water governance (10%), technical and financial partners (5%), field professionals (10%), and government officials (10%). **This massive participation highlights the need for stakeholders to be informed about Congo Basin management issues and to contribute innovative solutions to the many challenges of water resource management in the Congo Basin**.

The presentations and discussions held over the four days were organized in the form of plenary sessions, parallel sessions, side events, poster presentations, and a Water Fair for innovations in the Congo Basin water resources sector. In total, 10 keynote presentations were made during the opening session, providing a broad strategic and policy guidance at the Science-Policy-Practice interface. For the Knowledge Management, Science, and Investment interface, 27 presentations were made in plenary sessions, 117 in parallel sessions, 63 poster presentations, and seven side events were organized.

The remarks of officials emphasized that the forum should not be viewed as a simple one-off event, but as a strong signal in favor of fairer, more inclusive, and equitable water governance in the Congo Basin.

The various discussions took place around six interconnected thematic areas, each highlighting a strategic set of issues related to water resource services in the Congo Basin. The discussions were structured to identify the real challenges of the Congo Basin water resource management, the availability of data and decision-making tools, and innovative solutions to guide knowledge production and the formulation of relevant, operational recommendations aligned with regional and international priorities. The thematic areas discussed during this Forum encompass the following:

- Water – Climate – Forest – Biodiversity – Carbon
- Water and Energy Transition
- Water, Navigation and the Blue Economy
- Water, Agriculture and Food Security
- Drinking Water, Hygiene and Sanitation
- Water, Society, Health, the Private Sector and Governance

The Water – Climate – Forest – Biodiversity – Carbon theme explored the complex and interdependent interactions between water resources, forest ecosystems, wetlands, peatlands, biodiversity, and the carbon cycle in a context marked by climate change. This theme highlighted the need for a participatory approach to environmental management to preserve the vital functions of ecosystems and promote clean technologies and local know-how.

The Water and Energy Transition theme addressed the challenges related to the design, sizing, and management of complex hydraulic and energy systems, and highlighted conversion technologies adapted to available resources, concepts on the efficiencies of different renewable energy sectors, and an understanding of policies to support regional energy development. This theme highlighted the need for capacity building to actively contribute to resolving energy-related environmental issues, while integrating local specificities and the imperatives of hydraulic resource efficiency. It identified opportunities related to the development of renewable energies in the basin (hydroelectricity, solar, energy mix).

The Water, Navigation, and Blue Economy thematic area explored synergies between inland waterways, river transport, port governance, and sustainable economic development based on aquatic resources; while also identifying opportunities for improving navigation infrastructure in the Congo Basin, promoting responsible and inclusive economic models in river and coastal areas, and assessing the environmental and social impacts of river activities. The information provided in this thematic area is essential for issues related to the analysis, design, and maintenance of waterways, and for the monitoring and evaluation of public policies related to navigation.

The Water, Agriculture, and Food Security thematic area highlighted the role of water management in agricultural performance and the resilience of regional food systems. aligning them with the essential areas of quantifying crop water needs, planning and sizing appropriate irrigation systems, managing flow in canals, assessing the benefits of drainage based on technical, economic, and environmental criteria, and designing efficient drainage networks. The theme also made it possible to identify irrigation methods adapted to local contexts, plan the necessary human and financial resources, manage water excesses or deficits during critical periods, and implement essential precautions to protect soils and ecological balances.

The Drinking Water, Hygiene, and Sanitation theme helped clarify the major challenges related to equitable access to drinking water and decent sanitation services, as well as to identify sustainable technologies for scalable drinking water systems and their resilience to environmental impacts. It also provided an in-depth understanding of urban wastewater collection and treatment system management methods, as well as methodological tools for identifying needs, planning interventions, and developing sanitation master plans adapted to local contexts. Projections for the future of the drinking water, hygiene, and sanitation sector in the Congo Basin countries are alarming, but we must get to work now if we are to solve the puzzle.

T**he Water, Society, Health, Private Sector, and Governance thematic area** explored the institutional, sociopolitical, economic, health, and legal dimensions of water resource management in the Congo Basin. It highlighted the importance of a single, multi-level, inclusive, and coherent governance of the Congo Basin's water resources, capable of addressing the growing challenges of resource scarcity, inequalities in access, conflicts over use, health crises (particularly within a "One Health" approach), and environmental and economic pressures. The information obtained from this theme will help strengthen regulatory frameworks, encourage active private sector participation in the provision and management of water services, and promote the effective engagement of local communities and civil society organizations.

During these four days, we also heard presentations on the experiences of major tropical river basins, highlighting the cases of the Amazon basins, Southern African countries, and the Lake Chad Basin. The key message conveyed by these experiences reflected the need to strengthen South-South collaboration.

Overall, the various discussions highlighted the urgent need to strengthen:

- Integrated water resource governance from a transboundary and inclusive perspective;
- Production of and access to reliable data to support decision-making;
- Community resilience in the face of pollution, usage conflicts, and water crises;
- Regional and international cooperation, drawing inspiration from other major river basins such as the Amazon.

Several recommendations emerged from the thematic presentations for specific actions aimed at promoting improved access to water resource services in the Congo Basin. The key cross-cutting recommendations include:

- Institutionalizing the Forum as a permanent regional platform for science-policy-practice interface;
- Strengthening the Congo Basin's leadership in global environmental diplomacy;
- Structuring a portfolio of strategic transboundary projects;
- Promoting inclusive and participatory territorial governance;
- Expanding South-South partnerships and activating sustainable financing mechanisms.

Ultimately, the second edition of the Congo Basin Forum stressed that sustainable water management is a key asset for peace, prosperity, and resilience for the populations of the Congo Basin. It calls for international recognition of the basin as a public good, essential to the hydrological, climatic, and ecological balance of the planet.


FORUM
DU BASSIN
DU CONGO
2025
DEBOUT, PEUPLE DU CONGO
INCUBATEUR DU GÉNIE SCIENTIFIQUE CONSOLAIRE "IGSC/APSEC"
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1. Background and rationale

An unprecedented acceleration of global warming, mainly due to greenhouse gas emissions from human activities, is highlighted in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). This report notes an average increase in global surface temperature of 1.1°C compared to the pre-industrial period. Regardless of the emissions scenario considered, the threshold of 1.5°C of global warming is projected to be reached by the early 2030s. Limiting this warming to 1.5°C or 2°C remains possible, but requires rapid, deep, and sustained reductions in greenhouse gas emissions, including achieving net-zero CO_2 emissions globally, while significantly reducing other greenhouse gases. In this context, large tropical river basins, such as the Congo Basin, should play a key role in regional cooperation to combat climate change, given their potential to offer **nature-based solutions**, particularly in terms of carbon sequestration, the maintenance of hydrological regimes, and ecosystem resilience.

The Congo Basin represents the geographical region located in central Africa, which contains the second largest hydrographic basin and the second largest forested area in the world after the Amazon Basin; the Democratic Republic of the Congo (DRC) accounts for two-thirds of its total area.

The basin covers an area of $3.7 * 10^6$ km^2, generates an annual volume of water of about $1300 * 10^9$ m^3 at its outlet, and contains more than half of Africa's freshwater reserve. The Congo Basin contains the second largest area of tropical forest on the planet, with 268 million ha of tropical rainforest. In terms of CO_2 sequestration per unit area (ha), the forests of the Congo Basin sequester more than those of the Amazon or elsewhere, i.e. about 1.7 tonnes of CO_2/ha, compared to 1.2 tonnes by the forests of the Amazon Basin. In addition to forest ecosystems, the Congo Basin has a great diversity of other ecosystems that also play a major role in the biogeochemical cycle. These include the lake system, flooded wetlands and plains, and large areas of peatlands. The Congo Basin also offers opportunities for the production and satisfaction of many goods and services, including large-scale irrigated agriculture, fisheries, hydropower, drinking water supply, transport and the maintenance of aquatic biodiversity. It also has unique and diverse biodiversity and natural assets that place it in a relevant geostrategic position. The basin plays a key role in the circulation of atmospheric moisture and carbon budgets on a global scale. As a whole, the Congo Basin has strategic potential to play a leading role in regional integration, contributing to poverty reduction while strengthening sustainable livelihoods and generating economic opportunities for local communities.

However, global assessments as well as development reports frequently place the Congo Basin countries in the context of a water access crisis, a situation largely attributed to insufficient technical capacity, a lack of adequate infrastructure, and weak institutional coordination to optimize water resources services. These countries face multiple challenges in ensuring integrated, equitable and sustainable management of their water resources, in a context of increasing demographic pressure. This includes the need to

ensure universal access to safe drinking water, optimize water allocation for agriculture and industry, efficiently exploit hydropower potential, and strengthen the governance of transboundary watersheds in the face of the impacts of climate change. Some of the key challenges identified include:

- National Integrated Water Resources Management (IWRM) Plans and a holistic approach to water sector management in the Congo Basin;
- Coordination between the different actors involved, between the different sectoral ministries and actors involved in water management;
- Institutional, technical and financial capacity to coordinate multi-sectoral water investments and to holistically and sustainably manage natural water resources to provide services to its growing population;
- The persistence of climate variability and change and recurrence of extreme events and the risks of natural disasters;
- The proliferation of mining, industrial and plastic pollutions;
- The lack of infrastructure to mobilize existing water resources and promote improved access to water resources services;
- Existing regulatory frameworks.

Despite its importance, the Congo Basin receives little attention compared to other major tropical basins in the Amazon and Southeast Asia. For example, between 2008 and 2017, the Congo Basin received only 11.5% of international financial flows for the protection and sustainable management of tropical forests, compared to 55% for Southeast Asia and 34% for the Amazon. The positive impact of this investment on conservation and community well-being remains equally puzzling. This neglect has tangible and worrying consequences. The Congo Basin remains the only major tropical basin in the world without sufficient data to analyze past trends in extreme climate events. The mechanisms governing precipitation patterns, as well as the water supply dynamics of the ecosystems that depend on them, remain largely unknown. Moreover, field data are insufficient to allow scientists to robustly understand precipitation variability, its regional and global climate drivers, as well as the interactions with the ecosystems that depend on it for their ecological functioning.

The Congo Basin's ecosystems and diverse resources coexist with less developed economies and poverty. The natural abundance in the Congo Basin is often seen as an opportunity to support economic growth. However, this creates an "apparent" conflict between preserving natural capital and reducing poverty. In this context, it is important to invest in scientific research and technological innovation to promote the emergence of a sustainable development model based on the balance between the conservation and optimal exploitation of natural resources for the socio-economic well-being and resilience of communities in the Congo Basin.

The achievement of sustainable development and inclusive growth in the Congo Basin would be severely undermined if the natural resources of the Congo Basin are not managed and used in a sustainable, integrated and efficient manner. As the Congo Basin countries strive to improve political, economic and social stability, as well as industrial development, the need for water security will become increasingly important. If this aspect is neglected, there is a risk of conflict.

2. Objectives of the Forum

The second edition of the Congo Basin Forum aimed to provide an opportunity for the exchange of scientific knowledge and the sharing of experiences in order to assess our efforts in terms of new available data, scientific advances and technologies applicable to the monitoring of water resources, and existing gaps for a match between conservation and socio-economic well-being objectives in the Congo Basin, this with a view to promoting the emergence of a sustainable development model based on the management of water resources services in the Congo Basin. More specifically, the second edition of the Congo Basin Forum aimed to:

- Disseminate the results of research activities carried out on the Congo Basin to a wider community of researchers, managers and users of this basin;
- To take stock of current knowledge and progress made in the understanding of the dynamics and processes of water resources in the Congo Basin, to facilitate the exchange of information and to define the axes of innovative scientific research for this basin;
- Promote mutual learning on interventions carried out by different actors on improving access to water resources services in the Congo Basin;
- Share experience on other research initiatives conducted in other major river basins in Africa and the world;
- Stimulate partnership and networking, and create opportunities for future investment in research and development of water resources services in the Congo River Basin.

3. Course of the activities

3.1. Methodological approach

The methodology adopted for the organization of the second edition of the Congo Basin Forum is based on a scientific and participatory structure aimed at maximizing the impact of the exchanges around the central theme: "***Unlocking the potential of water resources services to achieve sustainable development in the Congo Basin*** ". This methodology is based on the following complementary components:

- An initial political framework through official speeches by the authorities of the Basin countries, providing political guidance;
- Plenary sessions with expert keynotes, intended to introduce the major issues on water resources services in the Congo Basin and stimulate collective reflection;
- Side events on research and development projects funded by the various donors and poster presentations, promoting the dissemination of specific knowledge;
- Thematic sessions covering the interactions between water and key ecosystem services/domains, namely:
    (1) Water – Climate – Forest – Biodiversity – Carbon;
    (2) Water and Energy Transition;
    (3) Water, Navigation and Blue Economy;
    (4) Water, Agriculture and Food Security;
    (5) Drinking water, hygiene and sanitation;
    (6) Water, Society, Health, Private Sector and Governance.

Discussions also revolved around the experiences of large tropical river basins, noting the cases of the Amazon basins, southern African countries and the Lake Chad Basin, **stressing the need to strengthen South-South collaboration**. All of these exchanges aim to identify the real challenges related to the paradox of water resources management in the Congo Basin, in particular the availability of data, access to decision-making tools, and the need for innovative solutions. This methodology thus promotes a co-construction of responses, by integrating scientific knowledge, public policies and feedback from actors in the field, in order to produce operational recommendations, aligned with regional and international priorities.

Figure 1 below summarizes the major activities that structured the second edition of the Congo Basin Forum. It highlights the different methodological components of policy framing to thematic sessions, including parallel activities and thematic sessions. This visual representation makes it possible to grasp the logical and progressive articulation of the forum's sequences.

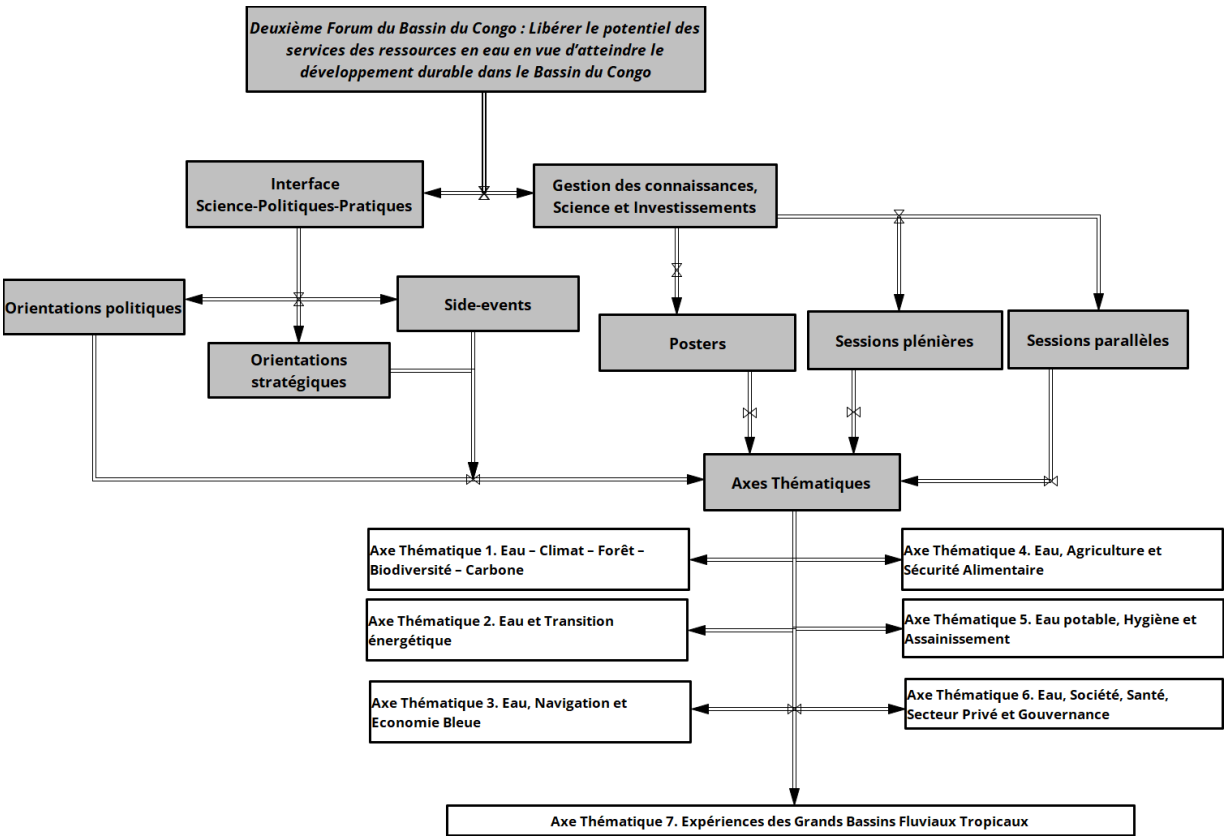

Figure 1. The major activities that characterized the Second Edition of the Forum

3.2. Participants

For four days, 843 participants from the member countries of the Congo Basin and the world, including Angola, Algeria, Belgium, Brazil, Burundi, Cameroon, Canada, China, Central African Republic, France, Gabon, Germany, India, Japan, Kenya, Niger, Republic of Congo, South Africa, Switzerland, Tanzania, United Kingdom and United States of America (USA), took an active part in person in this second edition of the Congo Basin Forum. The DRC was widely represented with participants from Kinshasa and the provinces. The categories of participants represented were researchers and scientists (50%), students (15%), civil society organizations involved in water governance (10%), technical and financial partners (5%), professionals in the field (10%), and members of governments (10%). Of this participation, we retain the share of women at 35% and men at 65% (Figure 2).

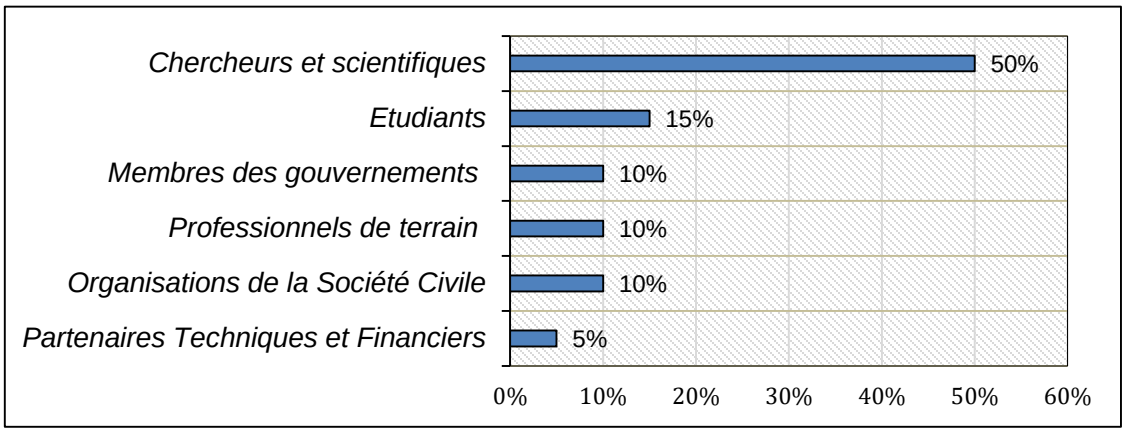

Figure 2. Proportion of different categories of participants

This massive participation reflects the expression of the stakeholders to be informed on the management issues of the Congo Basin, but also to contribute with innovative solutions to the many challenges of water resources management in the Congo Basin.

4. Scientific communications

The presentations and scientific exchanges held during the four days of the Forum were organized in the form of plenary sessions, parallel sessions, side-events, poster presentations and a Water Fair dedicated to innovations in the water resources sector of the Congo Basin. A total of 10 key papers marked the opening session, providing broad strategic and policy directions to the Science-Policy-Practice interface. For Knowledge Management, Science and Investments, 27 papers were presented in plenary sessions, 117 in parallel sessions, 63 in poster form, and 7 side-events were organized. In terms of thematic areas, the Forum welcomed:

- 77 communications for the Thematic Axis Water – Climate – Forest – Biodiversity – Carbon,
- 22 for the Water and Energy Transition Thematic Axis,
- 18 for the Water, Navigation and Blue Economy Thematic Axis,
- 16 for the Water, Agriculture and Food Security Thematic Axis,
- 31 for the Drinking Water, Hygiene and Sanitation Thematic Axis,
- and 43 for the Thematic Axis Water, Society, Health, Private Sector and Governance.

The seven side-events were organized in collaboration with several partners: the African Development Bank via its PRISE project, the German cooperation (GIZ) via the WEEN project, the United Nations Environment Programme, the Interreligious Initiative for Tropical Forests, the Institute of Research for Development (France), UNESCO, as well as the Congolese Scientific Engineering Incubator of the Ministry of Scientific Research.

4.1. Science-Policy-Practice Interface

4.1.1. Opening session

The opening session of the second edition of the Congo Basin Forum aimed to take stock of water resources management, the challenges of access to water resources services, and to give guidelines for the conduct of the thematic sessions. The opening session served as a science-policy-practice interface, a framework for exchange to elucidate the challenges of science and the needs of decision-makers to achieve sustainable development in the Congo Basin. The various presentations held during the opening session were made by key people from the scientific world and experts from governmental or international institutions, and revolved around the thematic axes chosen for the second edition of the Congo Basin Forum. This opening session also served as an exchange of experience on the large tropical basins. These are the following presentations:

1. State of play of the Congo Basin: To set the regional framework, Professor *Raphaël M. Tshimanga*, Director of the Congo Basin Water Resources Research Center

(CRREBaC) and the Regional Water School of the University of Kinshasa, Member of the Economic and Social Council (CES/DRC) and Co-President of the Science Initiative for the Congo Basin (CBSI), presented an in-depth diagnosis of the Congo Basin to provide an up-to-date overview of its water resources, climatic and anthropogenic dynamics, associated governance challenges as well as knowledge and capacity building needs. He also presented the systemic approach that can be applied in the management of water resources in the Congo Basin with a view to contributing to an integrated understanding of the interactions between the environmental, social and economic components of sustainable development.

2. Water – Climate – Forest – Biodiversity – Carbon: In connection with the global challenges of climate and biodiversity, Ambassador *Tosi Mpanu Mpanu*, Senior Advisor to the Head of State in charge of the Environment, Urban Planning and Mobility (DRC), shared a strategic vision integrating the dimensions of water, climate, forestry, biodiversity and carbon.
3. Water and Energy Transition: The energy transition, at the heart of sustainable development policies, was addressed by Eng. *Jean Baptiste Mianza Kapit*, Chief of Staff and Head of International Cooperation at the Congolese Agency for Ecological Transition and Sustainable Development (ACTEDD) and Lecturer at the Regional Water School of the University of Kinshasa.
4. Water, Navigation and the Blue Economy: The link between water, navigation and the blue economy was explored by Professor Daniel Mulenda Lomena, a specialist in green governance and ecosystem management at the Regional School of Water of the University of Kinshasa. His presentation highlighted the synergies between inland waterways, river transport, port governance and sustainable economic development based on aquatic resources; while identifying opportunities for improving navigation infrastructure in the Congo Basin, promoting responsible and inclusive economic models in river and coastal areas, and assessing the environmental and social impacts of river activities.
5. Water, Agriculture and Food Security: Due to the unavailability of the communicator planned for the theme "Water, Agriculture and Food Security", a flyer was presented to set out the DRC's vision on this strategic theme. This document is part of the country's commitment to the Sustainable Development Goals (SDGs) by 2030, ratified by the Congo Basin states. The DRC underlines the central role of water in agricultural development and economic growth, with particular emphasis on enhancing the agricultural sector through the adoption of efficient, water-saving and resilient irrigation methods to the effects of climate change.
6. Drinking Water, Hygiene and Sanitation: The challenges of access to drinking water, hygiene and sanitation were developed by Dr. David Tshilumba Mutombo, Director General of REGIDESO SA, based on operational experience in the DRC. Projections on the future of the drinking water, hygiene and sanitation sector in the Congo Basin countries are alarming, but we must get to work now to meet the challenge. In this regard, there is an urgent need to plan and execute major

infrastructure projects at least 20 years before 2050, to be able to provide a minimum level of public utility service.

7. Water, Society, Health, Private Sector and Governance: Professor *Mara Tignino*, Lecturer and Researcher at the Faculty of Law and the Institute of Global Studies of the University of Geneva, and Senior Expert in International Water Law at the Geneva Water Hub, provided legal and institutional insight into the interactions between water, society, health, the private sector and governance.
8. Experiences of large tropical river basins: Broadening the perspective to the Amazon basin, Dr. *Ayan Santos Fleischmann*, Researcher at the Instituto de Desenvolvimento Sustentável Mamirauá, shared the Brazilian experience in integrated water resources management. The contribution of space technologies in hydrological monitoring was brilliantly presented by *Dr. Fabrice Papa*, Director of Research at the IRD, through concrete examples on African basins. Finally, Professor *Jean-Marie Kileshye Onema*, Executive Secretary of WaterNet/SADC, presented lessons learned from integrated management in SADC basins, highlighting the importance of regional cooperation and South-South experience sharing.

4.1.2. Summary of the officials' speeches

The key presentations of the opening session were followed by speeches from officials, https://www.youtube.com/live/MpOyLyTHIt0 . Those present had the opportunity to gain an in-depth understanding of the real issues related to water resource management thanks to previous interventions**. These speeches emphasized that the forum should not be seen as a simple one-off event, but as a strong signal in favor of fairer, more inclusive, and equitable water governance in the Congo Basin.**

In their speeches, the Rector of the University of Kinshasa (UNIKIN), the President of the National Scientific Council (CSN) and the Permanent Secretary of the Congolese Academy of Sciences (ACCOS) highlighted the urgency of the scientific approach to build a resilient, green and inclusive development model in the Congo Basin, the achievement of which depends on political will and adequate scientific means to unlock the potential of its ecosystem and socio-economic services: access to drinking water, irrigation, hydroelectricity, river transport, climate regulation and biodiversity preservation. Their speeches emphasized the need for synergy between scientists, decision-makers and practitioners. The International Commission for the Congo Basin Oubangui Sangha (CICOS) similarly addressed the need for synergy between scientists and politicians to address the multiple pressures facing the Congo Basin's water resources, which requires coordinated, innovative, and above all sustainable responses, while highlighting the key role of scientific and technological innovations such as the development of smart hydrometeorological observation systems, the use of satellite imagery, hydrological modeling, digital IWRM tools, and nature-based solutions that offer unprecedented opportunities to improve the planning, management, forecasting, and resilience of our

water systems. The CICOS speech concluded with a call to make water not a source of conflict, but a factor of resilience, shared prosperity, unity, and regional integration. The Secretary General of the Ministry of Environment and Sustainable Development (MEDD), representing the Minister who was unable to attend, supported the role of water in maintaining the forest ecosystems of the Congo Basin, and the Government's firm commitment to valuing water resource services to achieve the Sustainable Development Goals in the Congo Basin

The Economic and Social Council (CES) committed to integrating the recommendations from the forum into its official Opinions, in order to guide public policies towards better valuing the services provided by water resources, in line with the Sustainable Development Goals (SDGs). Recognizing the urgency of collective and coordinated action, the creation of a Congo Basin Working Group within the CES was announced, tasked with raising awareness, advocating, and mobilizing stakeholders at all levels, with the aim of strengthening the resilience of riverside communities to the effects of climate change. Under the unifying theme "Unlocking the potential of water resource services for sustainable development in the Congo Basin", the forum was presented by His Excellency the Minister of Scientific Research and Technological Innovation as a strategic crossroads of research, knowledge, action and innovation, serving the preservation and enhancement of one of the largest and most precious natural heritages on the planet.

4.1.3. Side-Events

Several side-events enriched the Forum's program, illustrating the diversity of initiatives underway in the Congo Basin. The following side events showcased innovative projects, integrated approaches and concrete tools for sustainable water resource management:

1. PRISE Project – Strengthening Socio-Economic Infrastructure in the Central Zone of the DRC, initiated by the African Development Bank. This project highlights the importance of water infrastructure for local development and the improvement of the living conditions of the Congolese population.
2. Nexus WEEN Project – Water, Energy, Ecosystems, co-organized by GIZ-WEEN, MEDD-DRE, CRREBaC. An integrated approach that demonstrates how the synergy between water, energy and ecosystems can strengthen climate resilience in the Congo Basin.
3. IKI – Sustainable Peatland Management of the Congo Basin, organized by UN-Environment/UNEP. An initiative that promotes the ecosystem services of peatlands and offers management tools based on scientific data.
4. "No Water, No Forests, No Future" campaign, initiated by the Interfaith Initiative for Tropical Forests. An interfaith mobilization that reminds us of the vital link between forests, water and the future of future generations.
5. Capacity building on water data modelling and management tools, by the IRD in collaboration with the CRREBaC and the ERE. This technical support is essential to improve water governance through the mastery of modelling and data management tools.
6. MAB and IHP Programmes – Man and the Biosphere / Intergovernmental Hydrological Programme, by UNESCO. These programs promote a balanced management between human needs and the preservation of aquatic ecosystems.
7. Congolese Scientific Engineering Incubator (IGSC), set up by the Ministry of Scientific Research and Technological Innovation. It is a showcase for local innovation, highlighting the Congolese scientific potential for sustainable water management.

4.2. Knowledge Management, Science and Investment Interface: Thematic Sessions

4.2.1. Thematic area 1. Water – Climate – Forest – Biodiversity – Carbon

4.2.1.1. Specific context of the thematic axis

The Congo Basin is, along with the Western Pacific Ocean and the Amazon Basin, a major global precipitation centre that ensures the recycling of atmospheric moisture of global significance. The presence of tropical rainforest, which represents about 44% of the basin's surface area, promotes the basin's ability to recycle moisture. It is estimated that more than half of the precipitation is recycled in the Congo Basin, and that through the transport of atmospheric moisture, the Congo Basin contributes to precipitation in the Sahelian and eastern parts of Africa. The current structure, organization and composition of the Congo Basin forests are the result of a long historical process of alternating hot and humid periods as well as cold and dry periods, due to glaciation cycles. In terms of biodiversity, climatic forest refuge areas are particularly interesting because the species richness and endemism rates are particularly high.

The Congo Basin ecosystems (river system, tropical forests, wetlands, peatlands, biodiversity) are highly interconnected and form an integrated ecological system directly supporting the livelihoods of more than 100 million people.

The Congo Basin tropical forests are the world's leading forest carbon sink with 1.5 Gt CO_2 /year of absorption and 8% of the world's terrestrial forest carbon. The Congo Basin is home to the world's largest tropical peatland complex, storing the equivalent of 3 years of global emissions, of which only 8% is protected. Peatlands are formed and maintained by stable hydrological conditions and conversely they filter and regulate water and store a lot of carbon, the release of which could have a strong impact on the climate. People depend on these ecosystems for water, food, wood, medicine, spirituality. Ecological degradation leads to food insecurity, poverty and conflict.

These vital ecosystems are highly threatened by various anthropogenic activities. Deforestation reduces rainfall, disrupting the water regime, affecting rivers, soils, wetlands and agriculture. Forest fragmentation disrupts ecological corridors, reduces habitats, and increases human-wildlife conflict.

The Water-Climate-Forest-Biodiversity-Carbon thematic axis aimed to promote sustainable management practices, reconciling the preservation of terrestrial and aquatic ecosystems with the enhancement of ecosystem services, including carbon sequestration and climate resilience.

This thematic area explored the complex and interdependent interactions between water resources, forest ecosystems, wetlands, peatlands, biodiversity and the carbon cycle in a context marked by climate change. Protecting critical ecosystems requires a holistic

approach at the watershed level, to prevent ecological degradation and conflicts of use, while limiting pollution that threatens human health, food security, and the stability of natural environments. This theme highlighted the need for a participatory approach to environmental management to preserve the vital functions of ecosystems and promote clean technologies and local know-how. It made it possible to identify concrete development options to preserve the ecosystem balances of the Congo Basin, while meeting the socio-economic needs of local populations.

4.2.1.2. Presentations Plenary Sessions

The plenary sessions of this theme were marked by high-level presentations (keynotes), which provided an opportunity to share up-to-date scientific knowledge and strategic perspectives on peatlands, water resources, and the dynamics of the Congo Basin. The following papers were presented:

1. National Peatland Strategy of the Democratic Republic of Congo: state of implementation, challenges and perspectives, presented by Mr. Jean-Jacques

Bambuta Boole, National Coordinator of the Peatland Management Unit, Ministry of Environment and Sustainable Development, DRC.

2. The swamps of the Congo Basin: extent and distribution, presented by Professor *Jean Robert Bwangoy*, Department of Natural Resource Management, University of Kinshasa; Managing Director of ERA-Congo (Ecosystem Restoration Associate, Wildlife Works Carbon).
3. Unprecedented datasets from spatial hydrology and hydrological and hydrodynamic modeling for real-time monitoring and climate studies in the Congo River Basin, presented by Dr. *Benjamin Kitambo*, Professor-Researcher at the Faculty of Science and Technology, University of Lubumbashi; Post-doctoral fellow at the University of Stuttgart (Germany); Teacher-Researcher at CRREBaC-ERE, DRC.
4. Timing of peat initiation across the central Congo Basin, presented by Dr *Greta Dargie*, CongoPeat Project Researcher, University of Leeds.
5. Advancing Hydrological Forecasting in the Congo River Basin and Globally Using Satellite Remote Sensing: Applications of SWOT and Sentinel Data, presented by Dr. *Chandana Gangodagamage*, Researcher at NASA / OEILSAT LLC.
6. New measurements of the hydrodynamics of the Congo River and the Kasai River, presented by Professor *Raphaël Tshimanga*, Director of CRREBaC and Teacher-Researcher at the Regional School of Water, DRC.
7. Comprehensive Baseline River Surveys of the Congo Headwaters, presented by Dr. *Rainer von Brandis*, Director of Research, National Geographic Okavango Wilderness Project & The Wilderness Project, South Africa.
8. What do we really know about the climate of the Congo Basin? Advocating for a data-driven environmental policy, presented by Dr. *Georges-Noël Longandjo*, Researcher at the University of Cape Town, South Africa, and the Higher Institute of Applied Techniques, DRC.
9. The drainage system of the Congo River Basin: a geo-legacy of the geodynamic evolution of the African plate, presented by Professor *Étienne Kadima*, University of Lubumbashi, DRC.
10. Contribution of nuclear techniques to the development of the potential of groundwater resources in the Congo Basin, presented by Professor *Antoine Mfumu*, CGEA/CREN-K & University of Kinshasa.
11. Quantification and Characterization of the Spatial Distribution of Groundwater Resources from Space in the Congo River Basin, presented by Dr. *Benjamin Kitambo* (see presentation n°3).

4.2.1.3. Presentations Parallel Sessions – Oral Communications

1. Variability and spatio-temporal trends in climate aspects (temperature and precipitation) in the northern basin of Lake Chad, between 2001 and 2024, presented by *Professor Kiari Fougou Hadiza*, University of Diffa, Niger.

2. Effect of climate variability on carbon biomass and zooplankton abundance in Lake Kivu: ARDL Model Approach, presented by *Ir MSc Doudou Kintu*, École Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.
3. Quantifying Vegetation Change in Congo River Islands (2018–2024), presented by *Janae Steadman*, PhD student, University of Leeds, UK.
4. Use of machine learning and satellite data for improved flood prediction in the Lake Tanganyika basin, presented by *Ir Jean Claude Hakizimana*, Government of Burundi, Bujumbura.
5. Unraveling the roles of climate and land-use on the erosional transfer of carbon from source to sink through time in the Kasaï Basin, presented by *Nathan Carlier*, UCLouvain, Belgium.
6. A Decade of PALSAR-2 Data: Mapping Inundation Variability in the Cuvette Centrale, presented by *Paul Senty*, DHI, Denmark.
7. Advancing Science-Based Decision Making for Peatland Management in the Congo Basin, presented by *Simon Tanios*, UNEP, Kenya.
8. Trends in Extreme Precipitation in the Congo Basin and Its Relationship with Lightning Intensity (2017–2022) Using Vaisala GLD360 Data, presented by *Emmanuel Ndiadia*, University of Kinshasa, DRC.
9. Role of the Yangambi Flux Tower in the Study of Climate Change, presented by *Muhindo Fabrice*, University of Kisangani / Congoflux, DRC.
10. Analysis and modelling of rainfall series in the Kanshi watershed in Mbujimayi (Kasaï-Oriental, DRC), presented by *Ir Aimé Tshibanda*, Official University of Mbujimayi, DRC.
11. Understanding recent hydrological changes in the Ogooué River Basin using multi-source satellite radar altimetric data, presented by *Dr Sakaros Bogning*, University of Douala, Cameroon.
12. Persistence of drought effect on the Oubangui regime in Bangui, presented by *Professor Cyriaque-Rufin Nguimalet*, University of Bangui, Central African Republic.
13. Hydro-morphometric and climatic characterization of the sub-watersheds of the Tshopo River (DRC) by geomatics tools, presented by *Ir Katembo Mashauri Faidance*, University of Uélé, Kisangani; Inspector at the Congolese National Police.
14. A look at the chemistry of the waters of the Congo River and its tributaries, presented by *Bayonne Padou Sandra Murielle*, PhD student, Marien Ngouabi University, Republic of Congo.
15. The Highlands of Katanga: Aquatic Biodiversity, Conservation Challenges and Research Opportunities, presented by *Professor Emmanuel Abwe*, University of Lubumbashi, DRC.
16. Mapping and carbon storage of peatlands in the Congo Basin: the case of the ERA Congo concession in the territory of Inongo, Province of Maï-Ndombe (DRC),

presented by *Ir Etepe Glodi*, École Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.

17. Study of the population structure of Odonates in the Bumbu and Lukunga river basins in Kinshasa (DRC), presented by *Dr Sisa Mbungu Edouard*, National Pedagogical University, Kinshasa, DRC.
18. Assessment of the sustainable management of the ichthyological diversity of the fishing areas of the Malebo Pool, Congo Basin, presented by *Ir MSc Yves Lukuke*, Regional School of Water and CRREBaC, University of Kinshasa, DRC.
19. Underground Tree Biomass in Congo Basin Forests: Allometric Equations and Scaling with Above-ground Biomass, presented by *Kossi Ditsouga Alain Franck*, PhD Student, Masuku University of Science and Technology / Institute for Research in Tropical Ecology, Gabon.
20. Data collection and analysis on phytodiversity and carbon stock of trees in urban areas in Cameroon: the case of Yaoundé 6, presented by *Tchomcheni Aude Jolie*, University of Dschang, Cameroon.
21. Elucidating the driving factors of forest degradation in the Congo Basin: A case study of the Democratic Republic of Congo (DRC), presented by *Sadiki Kantakwa Grégoire*, University of Johannesburg, South Africa.
22. Gender and Climate Change, presented by *Mrs. Darie Jipsy*, Global Eco-village Network (GEN-RCA), Central African Republic.
23. Protected Areas and Natural Resource Extractivism in the Congo Basin: Between Conservation and Access Struggle in the Kahuzi-Biega National Park (Eastern DRC), presented by *Professor Idiatou Bah* and *Jean-Paul Byamungu*, Laval University, Canada.
24. Diversity and distribution of freshwater crabs in the Tshopo region, presented by *André Lofanga*, University of Kisangani, DRC.
25. Contribution of carbon credit in the fight against climate change and poverty of CLPAs, presented by *Mrs. Reine Carlia Mpassi Nsaou*.
26. Impact of deforestation on shrew (Eulipotyphla mammalia) in the Masako Forest Reserve (Kisangani), presented by *Yabidi Maritibu Michel*, UNIKIS / GYBN, DRC.
27. The Congo Basin: an endangered ichthyological biodiversity hotspot? The need for comprehensive and collaborative research, presented by *Katemo Manda Bauchet*, University of Lubumbashi, DRC.
28. Socio-economic and environmental impacts of afforestation of Mampu (8000 ha): restoration and sustainable use of forest resources, presented by *Ir Jean Claude Muliele Lumbu*, CADIM, DRC.
29. Dynamics of litter production and decomposition in two types of forests: dry land and swamp in the Cuvette department, Republic of Congo, presented by *Grâce Mercia Bobangui*, PhD student, Laboratory of Remote Sensing and Forest Ecology, Republic of Congo.

30. The Health of Forest Ecosystems in the Congo Basin: What Are the Challenges for Sustainable Development?, presented by *Kianguebeni*, Marien Ngouabi University, Republic of Congo.

4.2.1.4. Poster Presentations

1. Analysis of the Dynamics of Small Lake Systems in the Congo Basin in the Context of Environmental Change: The Case of the Lake Ilodi Watershed in Kwango Province, DRC (2000 to 2022). Ir. MSc *Rigobert Lunga Zola*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
2. Analysis of community entrepreneurial activities around the forests of Bitule and Omate (UCOFOBI) and their impact on the resilience of local populations. Mr. *Michel Mokili* Fauna & Flora, Lubutu Centre, Maniema, DRC.

3. Analysis of the threats and opportunities of biodiversity for the riparian populations of the Moanda Mangrove Marine Park, DRC. Mrs. *Fidélise Ntedika Benga*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
4. Anthropogenic threats to peatlands in the Cuvette Central of the Congo Basin. PhD student *in Engineering Spirou Lutonadio*, CRREBaC, Regional School of Water, University of Kinshasa, DRC
5. Contribution of carbon credits in the fight against climate change and poverty of CLPAs. Mrs. *Reine Carlia Mpassi Nsaou*, Marien Ngouabi University, Republic of Congo.
6. Application of Machine Learning and Deep Learning methods to the study of urban erosion: The case of the Funa River watershed (Lemba and Mont-Ngafula). Mr. *Papy Afusuy Mamoko*, ISTA, DRC.
7. Characterization of the Itimbiri River basin in the Wasalaka peatlands in the context of environmental change. Ir. *Marcel Bagala Adoko*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
8. Physico-chemical characterization of the peat bog of the Ossangou site (Congolese Basin). Mrs. Wando Martine *Marie Bernadia*, Marien N'GOUABI University, Republic of Congo.
9. Carbon sequestration potential in Rubber Plantations: A Complementary Approach to Tropical Forest Conservation Strategies, a Review. Mr. *Joël Mobunda Tiko*, IFA Yangambi, DRC.
10. Mapping of services and assessment of the economic value of water resources in the inkisi transboundary watershed. Ir. *Anaclet Kombayi-Mutanga*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
11. Diversity and distribution of freshwater crabs in the Tshopo region. Mr. *André Lofanga Bolukaoto*, University of Kisangani, DRC.
12. Water, forest and biodiversity in the province of Maniema in the DRC. Mr. *Moïse Saliboko Falay*, Provincial Coordination of Environment and Sustainable Development, DRC.
13. General information on radio-ecology. Mrs. *Drèche Mandoukou Yembi*, Marien NGOUABI University, Republic of Congo.
14. Hydromorphology and urban impact to the biodiversity inside the Maysha swamp in the south-eastern part of the Congo basin in Lubumbashi region. Mr. *Pascal Mambwe*, University of Lubumbashi, DRC.
15. Impact of community forestry in the sustainable management of forest ecosystems in the Congo Basin. Mr. *Zacharie Bokelo Iloko*, Independent Researcher, DRC.
16. Impact of forest cover loss on the evolution of hydro-climatic parameters in the catchment area of the Luki Biosphere Reserve. Ir. *Valentine Biwata*, CRREBaC and Regional School of Water, University of Kinshasa, DRC.
17. The chemical characterization of the waters of peat bogs with woody vegetation, Raphia laurentii, Raphia Sese and papyrus. Mrs. *Atipo Okiemba Divine*, Remote Sensing and Forestry Laboratory, Republic of Congo.

18. Sustainable wastewater management by Kinshasa households. Mr. *Eningola Mokonzo Caleb*, RENECO, Democratic Republic of Congo.
19. Evaluation of the impacts of anthropogenic activities and the effectiveness of mangrove reforestation on the water saturation of peatlands in the Mangrove Marine Park in the DRC. Mr. *Manifeste Wala Kafuti*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
20. The Congo Basin: Africa's Blue and Green Heart for Climate and Food Security. Mr. *Carel Yumbu*, Independent Researcher, DRC.
21. The river basins of the Niger, Senegal and the Black Volta: comparison and challenges. Mr. *Mariko Adama*, National Directorate of Hydraulics, Mali.
22. Impact of sustainable fishing exploitation by fishers. Mr. *Longenga Mayambi Jean-Felix*. National Group of Entrepreneurs for the Emergence of Congo, Democratic Republic of Congo.
23. Threats to the coastal biodiversity of Lake Tanganyika by anthropogenic activities in the city of Uvira in eastern DR Congo. Mr. *Papy Lubunga Dunia*, Hydrobiology Research Center (CRH-Uvira), Democratic Republic of Congo.
24. Modelling of water demand in the city of Masi Manimba in Kongo Central, DRC. Mr. *Christopher Ngwemi Kalaki*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
25. Modelling of aquatic ecosystems in the forests of Mai-Ndombe, Mr *Iwa Osey Trésor*, NGO THE MERIDIAN, DRC.
26. Portrait of the N'djili River watershed in Kinshasa. Mr. Pierrot Longa, Democratic Republic of Congo.
27. Carbon sequestration potential in rubber plantations: a complementary approach to forest conservation strategies. Mr. *Joël Mobunda* Tiko, IFA Yangambi, DRC.
28. Prediction of water load and loading of the N'djili River watershed by the SWAT model in the DRC. Mr. *Richard Gasigwa Sabimana*, CRREBaC and Regional School of Water, University of Kinshasa, DRC.
29. Ecology and water availability in the Congo. Mrs. *Divine Mutombo*, Independent Researcher, DRC.
30. Ecology and the environment in Hans Jonas, the emergence of a universal awareness. Mr. *Rigobert Mbima Kutwela*, CERDAS UNIKIN, DRC.
31. Estimation of the influence of land use on the hydrological parameters of the peatland area of the Itimbiri River watershed in the north-east of the Congo Basin in the context of climate change. Mr. *Marcel Bagala Adoko*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
32. Study of restoration projects and their impacts on climate and biodiversity in the Congo Basin. Mr. *Tsala Ekompari Otankouma*, Marien Ngouabi University, Republic of Congo.
33. Hydrogeological and hydrogeochemical study of aquifers in the Nsele watershed in Kinshasa. Mr. *Edison Ihome*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.

34. Evaluation of the sustainable management of the ichthyological biodiversity of the Malebo Pool Kinshasa, DRC. Ir. MSc *Yves Lukuke Aseke*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
35. Evaluation of the performance of satellite-based rainfall products in the South-East of the Congo Basin in Lubumbashi region. Dr. *Benjamin Kitambo*, University of Lubumbashi, Stuttgart University, CRREBaC-ERE, DRC.
36. Exploitation and marketing of *Prunus africana* (Hook. F.) Kalkman in North Kivu (DR Congo): Analysis of the local value chain and contribution to the livelihoods of forest communities. Mr. *Eloge Kambale*, ISEAVF, DRC.

4.2.1.5. Recommendations

The thematic session "Water – Climate – Forest – Biodiversity – Carbon" highlighted the major challenges facing this unique region, particularly under the combined effect of anthropogenic pressures and climate change. These challenges affect the management of water resources, the preservation of forest and aquatic ecosystems, the protection of biodiversity and the fight against carbon emissions. In this context, the recommendations resulting from this session aim to propose concrete, integrated and innovative solutions to strengthen the resilience of ecosystems and local communities in the Congo Basin. They are as follows:

1. **Protected Areas and Natural Resource Extractivism in the Congo Basin**

- Promote more sustainable and responsible management of mining in protected areas.
- Integrate environmental impacts into planning for the protection of parks, reserves and natural resources.
- Regulate mining in protected areas and impose the inclusion of social contributions (e.g. drilling projects).
- Apply the model of "model forests": governance, landscape, sustainability, knowledge sharing.
- Introduce an environmental tax on mining operators to compensate for pollution.

2. **Carbon Credits and the Fight Against Climate Change and Poverty – The Case of Indigenous Peoples' Local Communities (IPLCs)**

- Take into account the real needs of CLPAs in carbon projects.
- Involve CLPAs at all stages: design, implementation, evaluation.
- Train CLPAs in green jobs and alternative activities to the pressure on natural resources.
- Strengthen the technical and organizational capacities of CLPAs in the management of carbon credits.
- Promote multi-stakeholder partnerships (NGOs, government, private sector).
- Create monitoring and evaluation mechanisms to measure the environmental and socio-economic impacts of carbon projects.
- Conduct awareness campaigns on the benefits of selling carbon credits.

3. **The Congo Basin, an endangered ichthyofauna hotspot**

- Launch a comprehensive and collaborative research program on the fish fauna of the Congo Basin to fill knowledge gaps.
- Fight against all forms of water pollution in order to sustainably preserve aquatic biodiversity.

4. **Integrated and sustainable water resources management**

Adopt a holistic and integrated approach to water resources management in the Congo Basin sub-watersheds, taking into account the complex interactions between hydrological, ecological and socio-economic components. This involves coordination between the various local, national and regional actors to ensure a balanced exploitation of resources while preserving the vital ecosystem functions of wetlands and peatlands.

5. **Development of advanced hydro-climatic monitoring networks**

The deployment and consolidation of networks of efficient meteorological and hydrological stations is necessary for the real-time monitoring of key variables (precipitation, evapotranspiration, water levels, etc.). This data will make it possible to refine climate forecasts, assess the impact of different management strategies and anticipate the risks associated with climate variability.

6. **Application of advanced climate and hydrological models**

The use of advanced hydrological and climatic models must be systematized to simulate different scenarios of the evolution of the watershed under the effect of climate change. These simulations will inform strategic decisions, particularly for territorial planning, the management of water infrastructure and the protection of sensitive ecosystems.

7. **Restoration and conservation of wetlands and peatlands**

Wetlands and peatlands play a crucial role in hydrological regulation, biodiversity and carbon storage. It is essential to implement ecological programs to better conserve these ecosystems, including taking into account natural functions, reducing anthropogenic pressures and legally protecting these spaces.

8. **Construction of adapted water infrastructure**

It is essential to develop infrastructure capable of storing rainwater and creating hydrological buffer zones (e.g. retention basins, natural dikes), in order to mitigate seasonal fluctuations in flows and to ensure a stable water supply during dry periods.

9. Outreach, training and community involvement

The effectiveness of actions is largely based on local ownership of the issues and solutions. Targeted awareness-raising campaigns and technical training programmes for local communities should therefore be deployed, thereby strengthening their capacity to sustainably manage water resources and to actively participate in the planning of climate change adaptation strategies.

10. Development and implementation of supportive public policies

Clear and incentivizing policies must be formulated and implemented to support sustainable practices, promote ecological restoration, and encourage agricultural innovation. These policies will need to be supported by robust regulatory frameworks and appropriate economic incentive mechanisms (subsidies, green credits, environmental taxes).

11. Strengthening intersectoral and multi-stakeholder cooperation

Integrated water resources management requires collaboration between the water, agriculture, and environment sectors, as well as the commitment of public, private, scientific and civil society actors. The creation of platforms for dialogue and coordination is a key success factor for the coherent implementation of the proposed strategies.

For integrated and sustainable management, the concrete development options to preserve the ecosystem balances of the Congo Basin, while meeting the socio-economic needs of the local populations, are as proposed below:

- Promote sustainable community management of forests and peatlands;
- Develop innovative financing based on eco-assets;
- Extend and connect protected areas with biodiversity corridors;
- Developing climate-smart agriculture;
- Accelerating access to clean energy;
- Protect wetlands and peatlands through integration into land use plans and ongoing monitoring;
- Promote land observation technologies and the integration of data into decision-making;
- To generalize environmental education and the promotion of green jobs;
- Promote inclusive governance and regional coordination through greater community involvement in territorial governance;
- Engage the private sector in a contribution approach through investments of an inclusive positive nature.

4.2.2. Thematic area 2. Water and Energy Transition

4.2.2.1. Specific context of the thematic axis

The stability of the hydrological regime of the Congo River and other more favourable geomorphological conditions make the Congo Basin an internationally vital region for exceptional energy development in the face of rapidly growing regional and international energy demand. Pre-feasibility studies on this river basin have identified potential sites for the development of more than 44,000 MW of continuous power generation. The potential for more than 100,000 MW of additional construction is also highlighted. Based on these possibilities, some project proposals were developed, which included the establishment of an international electricity grid. The Congo Basin represents 13% of the world's hydroelectric potential, the equivalent of 100,000 MW. This would be enough to meet the current electricity needs of the entire African continent. Several regional initiatives have been launched in the field of interconnection projects. However, to date, less than 3% of this potential has been exploited. Despite this exceptional hydroelectric potential, the energy sector in the Congo Basin is essentially characterized by:

- The very striking contrast between the enormous energy potential available and its use: - The imbalance between the supply and demand of electrical energy, which is constantly increasing in view of the revival of economic activities (especially in the mining and real estate sectors) as well as population growth;
- The proper distribution of these potentials throughout the territory and the current rate of electricity supply;
- The obsolescence and obsolescence of existing infrastructure;
- The difficulty of accessing and mobilizing capital and the lack of capacity to guarantee financing.

The Water and Energy Transition Theme aimed to provide a transdisciplinary perspective to understand the links between water, energy and social security, with a view to sustainable development, while emphasizing the strategic interdependence between water resources and renewable energy production, particularly in the context of the ecological transition. It addressed the issues related to the design, sizing and management of complex hydraulic and energy systems, and highlighted conversion technologies adapted to available resources, notions on the yields of different renewable sectors, and the understanding of policies to support regional energy development. This theme highlighted the need for capacity building in order to actively contribute to the resolution of environmental issues related to energy, while integrating local specificities and the imperatives of water resource efficiency. It has made it possible to identify opportunities related to the development of renewable energies in the basin (hydroelectricity, solar, energy mix). It emerges from all the recommendations that the energy transition in the Congo Basin must be based on three major levers:

- Green electrification (hydroelectricity, solar, microgrids) as a direct response to the pressure on forests and a lever for improving living conditions;
- Sustainable water management, in synergy with renewable energies, to guarantee water security while reducing greenhouse gas emissions;
- The valuation of ecosystem services (in particular payments for environmental services – PES), in order to actively involve local communities in the sustainable preservation of the Basin's forests.

4.2.2.2. Presentations Parallel Sessions – Oral Communications

1. Anti-hydrosedimentation defense plans in Planetary hydroelectric facilities: Case of the Busanga BCR Arch Dam in DRC, presented by *Jean Baptiste Mianza Kapit*, ACTEDD / Regional Water School, University of Kinshasa (DRC).
2. Energy deficit in the DRC: Renewable energies, a solution for the electrification of the DRC, presented by *Emmanuel Musuyu Shindano*, CORAP (DRC).
3. How can we overcome irrationality in the hydropower production of the Congo Basin countries and promote sustainable development? State of play and prospects for one of the countries: Cameroon, presented by Dr. *Abang Mbarga* Nicolas Laurel, University of Yaoundé 1 (Cameroon).
4. Feasibility study of the thermal-tidal energy mix for the improvement of drinking water supply: Case of the city of Kenge in the DRC, presented by Ir MSc *Arnold Jonas Madiumba Bamba*, Regional School of Water and CRREBaC, University of Kinshasa (DRC).
5. Energy scenario of the DRC based on the development of its hydroelectric potential by 2050, presented by Ir MSc *Benjamin Kibungu*, Regional School of Water and CRREBaC, University of Kinshasa (DRC).
6. Techno-economic study of the exploitability of the waterfalls of the Luvua River for the production of electrical energy in Haut-Katanga, presented by Ir *André Kabwe*, Regional School of Water and CRREBaC, University of Kinshasa (DRC).
7. What about green hydrogen in the face of the energy transition in the DRC, presented by *Idris Mufuka Kudiye*, National Institute of Vocational Preparation (INPP), Kinshasa (DRC).
8. Development of a model of a round table for participatory management of water and solid biomass in the DRC, presented by Professor *Nicolas Onemba Shuku*, National Association for Environmental Assessment (Kinshasa, DRC).
9. Study of the production of green hydrogen by a photovoltaic source: Experimentation and modelling, presented by Ir MSc *Napoléon Kabama Kasombo*, École Régionale de l'Eau and CRREBaC, Faculty of Oil, Gas and Renewable Energies, University of Kinshasa (DRC).
10. Electrification of the DRC: Solutions for Reducing Pressure on Forest Ecosystems, presented by Ir MSc *Benjamin Kibungu*, Regional School of Water and CRREBaC, University of Kinshasa (DRC).

11. Thermal energy mix approach for improving water supply and reducing the carbon index of drinking water pumping stations using thermal energy, presented by Ir MSc *Arnold Jonas Madiumba*, Regional Water School and CRREBaC, University of Kinshasa (DRC).
12. Implication of correction bias on the quantification and decomposition of uncertainties in hydroelectric projections under different levels of global warming, presented by Dr. *Rodric M. Nonki*, University of Yaoundé 1 and École Nationale Supérieure Polytechnique de Douala, University of Douala (Cameroon).
13. Modelling and planning of water resources based on the catchment of the transboundary Inkisi River in the Congo Basin, presented by PhD student *Landry Nkaba Nzamipiele*, École Régionale de l'Eau and CRREBaC, University of Kinshasa (DRC).
14. Energy issues related to wood energy in deforestation projects during the first decade of REDD+ in the province of Tshopo (DRC), presented by *Abubakar Amani*, University of Kisangani (DRC).
15. Harnessing the DRC's Hydropower Potential for Sustainable Energy Development: Challenges and Opportunities, presented by Ir *MSc Napoléon Kabama Kasombo*, Faculty of Oil, Gas and Renewable Energy, Regional School of Water and CRREBaC, University of Kinshasa (DRC).
16. Micro-hydropower as a means of developing water resources in the Congo Basin, presented by PhD student *Boldiny Jiscar Matsinou*, Denis Sassou N'Guesso University, Brazzaville (Republic of Congo).
17. Payment for Environmental Services (PES) in the context of the REDD+ project and the fight against deforestation of the Luki Biosphere Reserve in the DRC, presented by Ir MSc *Emmanuel-Tsadok N. Mihaha*, Regional School of Water and Centre for Research in Water Resources of the Congo Basin (CRREBaC), University of Kinshasa (DRC).

4.2.2.3. Poster Presentations

IGSC/MSRIT

1. Hybrid power plants: towards sustainable decentralized electrification of isolated peri-urban and rural areas. Mr. *André Mampuya Nzita*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
2. Energy deficit in the DRC: Renewable energies a solution for the electrification of the DRC. Mr. *Emmanuel Musuyu Shindano*, CORAP, DRC.
3. Feasibility study of the project to build the 220 KV electricity interconnection line between Maquela-do-Zombo (Angola) and Kwilu (DRC). Mr. *Léon Mwanda Mizengi*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
4. Study of the modelling of urban energy systems in the Congolese context. Application to the case of the city of Kananga. Mr. *Popol Babia Mumpele*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.

5. Integration of complementary renewable energies to hydroelectricity for a balanced energy mix in the DRC by 2050 (Application to the city of Kinshasa). Mr. *Emmanuel Musuyu*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.

4.2.2.4. Recommendations

The key recommendations from the parallel sessions on the theme "Water and Energy Transition", formulated during the Forum, taking into account all the presentations and discussions on this theme, are as follows:

1. **Electrification to reduce pressure on forest ecosystems**
   - Prioritise rural and peri-urban electrification by focusing on cooking uses (and not just lighting) in order to reduce dependence on wood energy.
   - Increase national hydropower capacity by at least 500 MW every 5 years, sustainably exploiting the potential of the Congo River and its tributaries.
   - Support the dissemination of clean cooking technologies (improved cookstoves, LPG, biogas) through incentive policies, targeted subsidies and awareness campaigns.
   - Encourage the planned cultivation of woody species for sustainable charcoal mining, by integrating agroforestry into conservation policies.
2. **Development of micro-hydropower as a local driver**
   - To develop water resources through micro-hydroelectric power plants, adapted to isolated areas, to stimulate employment, irrigated agriculture, handicrafts and basic social services.
   - Create in each country a National Bureau of Micro-hydropower, composed of multidisciplinary teams (hydrology, civil engineering, electromechanics, etc.).
   - Foster the interconnection of microgrids to national grids to improve energy stability and resilience.
   - Develop a clear and incentivizing legal framework to regulate mini-grids and investments in SHPs (small hydropower plants).
   - Integrate micro-hydropower into climate contributions (NDCs) as a lever for decarbonizing the energy sector.
3. **Integration of renewable energies in water management**
   - Migrate thermal pumping stations (e.g. REGIDESO) to solar or hydrokinetic energy systems, for a more sustainable and less carbon-intensive water supply.
   - Integrate sustainability, environmental impacts, and profitability criteria into any drinking water energy supply project.
4. **Promotion of Payments for Environmental Services (PES)**
   - Institutionalize PES as a tool for forest conservation, particularly in protected areas.
   - Ensure sustainable financing through REDD+, carbon credits, or public-private partnerships.
   - Make renewable energy a pillar in the fight against deforestation, in particular through micro-hydropower and clean households.

- Actively involve local communities in the governance of PES, building on the pilot results (e.g. Luki Reserve) for basin-wide replication.

5. **Research, innovation and energy foresight**
   - Develop integrated CLEWs (Climate, Land, Energy, Water) scenarios to anticipate the combined effects of climate change, electrification and land policies.
   - Actively support the research, development and demonstration of green hydrogen technologies from local renewable sources (solar, hydropower, biomass) in the Congo Basin, integrating them into a regional strategy to diversify the energy mix.
   - Strengthening partnerships between research centres, universities and industrial players to accelerate innovation and technology transfer.

4.2.3. Thematic area 3. Water, Navigation and Blue Economy

4.2.3.1. Specific context of the thematic axis

The Congo Basin is known for its potential for river navigation, and since pre-colonial times, it has been used to supply international markets with natural resources such as timber, palm oil, copper, and many other natural resources. The Congo River is the main means of transport in a region where the maintenance of the road infrastructure remains a major challenge. Many more remote localities are only accessible by water, making the river the only transport infrastructure for a large part of the population. Trade is also heavily dependent on inland waterways: officially, more than 1.5 million gross tonnage are transported each year between Bangui and Kinshasa. The actual volume is even higher, as freight in the informal sector, which accounts for the bulk of goods transported, is usually not recorded. Despite its crucial importance for transport, the river infrastructure is deficient: ports are in ruins, jetties are collapsing, (warning) signs and signs are not maintained or renewed, and accidents are only increasing every year, causing enormous losses of life and economic property. Sections that were once navigable all year round can no longer be used for more than two hundred days a year, leaving some localities cut off from the outside world. The flow of the Oubangui, for example, a major northern tributary, has declined by a fifth over the past four decades.

Congo Basin member countries should integrate their transport policies around the important network of waterways that connect several countries in order to increase the competitiveness of intra-African trade. If this integration is accomplished, the Congo River Basin will become a breeding ground for economic growth in Africa, thus lifting millions of people out of precariousness while ensuring its role as a regulator of the climate and the blue economy, which constitutes the set of economic and social activities that depend totally or essentially on water: organic farming, green tourism, river-sea transport, port activities, forest economy, commodification of ecosystem services (carbon credits), hydroelectricity, eco-industries, wastewater recycling, etc.).

The Water, Navigation and Blue Economy Theme explored synergies between inland waterways, river transport, port governance and sustainable economic development based on aquatic resources; while identifying opportunities to improve navigation infrastructure in the Congo Basin, promote responsible and inclusive economic models in river and coastal areas, and assess the environmental and social impacts of river activities. The information provided in this theme is essential for issues of analysis, design and maintenance of inland waterways, and for the monitoring and evaluation of public policies related to navigation. Concerns related to the control of technical equipment and devices, in particular fixed and mobile markings as well as special structures, are an essential part of this theme, and are aligned with the challenges of safety, logistical efficiency and ecological sustainability in the blue economy. The theme made it possible to reconcile the economy with ecological and environmental priorities for enriching green economic growth and a regeneration of natural ecosystems that will guarantee sustainable happiness for all. Three main questions made it possible to understand the problem of the theme. These are:

- How can we hope to reduce deforestation when the Inga dam is not completed?
- How are we going to spare forests when slash-and-burn agriculture is the main source of food supply in several regions of the Congo Basin?
- Have we forgotten that a malnourished child in the first five years of life will significantly lose his or her ability to master science and technology?

4.2.3.2. Presentations Plenary Sessions

1. A First Multiscale 2D Hydrodynamic Model Calibration Over 1740 km of the Main Navigable Reach of the Congo River, presented by Dr. *Djamel Kechnit*, Congo Basin Water Resources Research Center (CRREBaC) & Regional Water School of the University of Kinshasa (ERE), DRC and Ecole Nationale Supérieure d'Hydraulique, Algeria
2. Optimizing Navigation in the Congo Basin with Real-Time Bathymetric Data, presented by Dr. *Kris De Decker*, Chief Technology Oc̃er, Optiriver, Antwerp. Belgium

4.2.3.3. Presentations Parallel Sessions – Oral Communications

1. Estimation of the flow of the Congo River during its crossing of the right arm of the STANLEY POOL (Pool MALEBO), presented by MSc *Cedrick Moleka Tsiba*, Marien NGOUABI University, Congo-Brazzaville.
2. Assessment of the water table of the city of Douala (Cameroon), presented by Dr. *Emvoutou Huguette Christiane*, University of Douala, Cameroon.
3. Application of machine learning and deep learning methods to the study of urban erosion: the case of the Funa River watershed in the communes of Lemba and Mont-Ngafula, presented by Mr. *Papy Afusuy Mamoko*, Kinshasa, DRC.

4. Assessment of hydrodynamics and sediment transport by combining ADCP and in-situ data in the Malebo Pool, Congo River, presented by *Grace Bissemo*, LMEI/CUSI/ENSP, Marien N'Gouabi University, Congo-Brazzaville.
5. Wadis Velocity Profiles Modelling Using Entropic Approach and NN One: A Comparative Study and Lessons for the Congo River, presented by Dr *Ammari Abdelhadi*, ENSH, Algeria.
6. Employing an Entropy-Based Approach for Bathymetry and Discharge Estimation in Large Rivers of the Congo Basin, presented by Dr *Djamel Kechnet*, ENSH, Algeria / École Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.
7. On the sedimentary dynamics of the sands of the middle course of the Kasai River and its implications on navigation (Ilebo Territory, Kasai Province/DRC), presented by Ir *Lowny Trésor Madienga Kitshiabi*, DRC.
8. Developing waterways for sustained growth in the Congo Basin, presented by Director General *Francis Nienge Nkita*, Fund for the Development and Maintenance of River and Railway Routes (FONEFF), DRC.
9. Optimization of inland navigation management: application of HEC-HMS hydrological modelling on the Lubi River in the DRC, presented by Ass. *Nana Kabujenda*, Regional School of Water and CRREBaC, University of Kinshasa, DRC.
10. Bathymetry and Discharge Estimation in Large and Data-Scarce Rivers Using an Entropy-Based Approach, presented by Dr *Djamel Kechnet*, ENSH, Algeria.
11. Modelling of the solid transport capacity of the downstream of the Congolese arm in the Congo River in 2024, presented by PhD student *Matsouele Nzonzi Bonheur*, Marien Ngouabi University, Congo-Brazzaville.
12. Land use and sediment transfer in the Tsiémé watershed from 1993 to 2023: population perception of the ecological impacts of the Tsiémé River, a tributary of the Congo River, presented by Professor *M'bouka Milandou Idriss*, Denis Sassou-N'Guesso University, Republic of Congo.
13. On the Water Front: Challenges and Innovations for Hydrological Measurement in the Congo Basin, presented by PhD student *Jean-Felly Ngandu*, École Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.
14. Demonstration of the Optiriver App, presented by Dr. *Kris De Decker*, Chief Technology Officer, Optiriver, Antwerp (Belgium) and Mrs. Sintija Gotharde, Business Developer, Optiriver, Antwerp (Belgium).

4.2.3.4. Poster Presentations

1. Contribution to the study of the development and maintenance of navigable passes in the face of the evolution of hydrological parameters: Case of the wandering region of the maritime reach of the Congo River. Mr. *Emery Murhula Mushamalirwa*, Regional School of Water and CRREBaC, University of Kinshasa, DRC.
2. Impact of deforestation on sediment production and its influence on navigation in the river-sea zone of the Congo River. Mr. *Augustin Likenge*, Regional School of Water and CRREBaC, University of Kinshasa, DRC.

4.2.3.5. Recommendations

The presentations highlighted the development of the water potential of the Congo Basin, highlighting the key role of major rivers such as the Congo and its tributaries (Tsiémé, Lubi) in economic development, inland navigation and the blue economy. Innovation in hydrological measurement and modeling, including entropic approaches, neural networks and 2D models, was presented as essential for estimating flows, modeling sediment dynamics and effectively managing scarce data rivers. At the same time, the rapid degradation of river ecosystems linked to urbanization, deforestation and water erosion is causing excessive sedimentation that threatens navigability and biodiversity. A strong link has been established between navigation, economic development and resource protection, with the blue economy as a major lever, subject to the sustainable management of aquatic ecosystems. Finally, insufficient hydrological data, field measurement capabilities and monitoring infrastructure have been widely recognized as a major constraint to optimal management. The policy recommendations are as follows:

- Raising the level of investment in the blue economy:
- Invest in clean energy production, fisheries, fish farming, aquaculture, and the conservation of aquatic ecosystems.
- Strengthen technical and institutional capacities: Support national and regional institutions in the acquisition of modern equipment (e.g. ADCP, bathymetric drones), the training of experts and the structuring of reliable hydrological databases.
- Develop an integrated blue economy strategy: Develop and implement coherent policies that integrate shipping, sustainable fisheries, ecosystem conservation, and local development in a green growth logic.
- Modernise and secure waterways: Invest in strategic dredging, waterway maintenance, signalling and port infrastructure to ensure efficient and safe inland navigation.
- Promote applied research and innovation: Support interdisciplinary research on hydrodynamics, sedimentology, and river-land interactions to better plan river development and prevent risks.
- Improving water governance at the basin level: Establishing a cross-border consultation framework to harmonize water use and preservation policies, with the active involvement of users, researchers and decision-makers.
- Update the legal instruments to regulate navigation and the blue economy in particular.
- Raise awareness among local populations and public authorities: Initiate environmental education and community participation programs on the impact of land use practices on river ecosystems and navigation.

4.2.4. Thematic area 4. Water, Agriculture and Food Security

4.2.4.1. Specific context of the thematic axis

Water is a key factor in agriculture, whether rainfed or irrigated, and plays a major role in agricultural production to achieve food security goals. In the context of climate change, the use of water efficiency in agriculture through adaptive irrigation systems is emerging as an effective measure for adaptation and sedentarization of farmers. The food supply situation is worrying in the Congo Basin. There are few irrigation projects of any size in the basin; Given the high rainfall, most crops are rainfed. And the majority of the population practices subsistence agriculture. Due to underdeveloped agricultural structures, the Congo Basin states are all net importers of foodstuffs, including cereals, maize and rice.

The Water, Agriculture and Food Security thematic area aimed to promote water-efficient agricultural practices, optimize irrigation systems at different scales, and better understand the interactions between agriculture, productivity and pressure on water resources. The presentations made in this theme highlighted the role of water management in agricultural performance and the resilience of regional food systems; aligning them with the essential areas of quantifying crop water requirements, planning and sizing suitable irrigation systems, managing runoff in canals, assessing the value of drainage according to technical, economic and environmental criteria, and designing efficient drainage networks. The theme also made it possible to identify irrigation methods adapted to local contexts, to plan the necessary human and financial resources, to manage water excesses or deficits in critical periods, and to implement the precautions essential to the protection of soils and ecological balances. Overall, agricultural policies in the Congo Basin countries remain dependent on the context of rain-fed agriculture, whose vulnerability is increasingly evoked with regard to climate variability and change. There is therefore the challenge of a clear strategy for the efficient use of water in agriculture through the establishment of irrigation systems to support agricultural production in the long term in the context of climate change, as well as standards for the application of water efficiency management tools in agriculture through adaptive irrigation systems. These include the existence and efficiency of irrigation and drainage networks; quantitative evaluation, methods of abstraction and mobilization of water for irrigation; efficient types and methods of irrigation; the design, planning and development of irrigation systems; the management of hydro-agricultural facilities; the development and rehabilitation of lowlands, water reservoirs, alluvial plains and water source catchment structures; soil defence and restoration; water and soil conservation.

4.2.4.2. Presentations Parallel Sessions – Oral Communications

1. Impact of climate change on the net irrigation water needs of the main cash crops grown in the N'djili River watershed/DRC, presented by Ir MSc *Henock Ngoyi Lumami*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.

2. Water, Agriculture and Food Security Nexus in the Congo Basin: the example of Congo Brazzaville, presented by Mr. *Joseph Gabriel Mokima*, Member of the Association of Nationals of the World of Water, Brazzaville, Republic of Congo.
3. Irrigation, a key to sustainable agriculture development in DRC, presented by Ir *Yokateme Tii-kuzu*, MabeleAgric, Kinshasa, DRC.
4. Using climate-smart approaches based on the optimisation of small-scale irrigation systems and quinoa adaptation in order to build resilient agricultural systems in the Congo Basin, presented by PhD student *Génie-Spirou Lutonadio*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.
5. Assessment of the Stochastic Frontier of the Economic Efficiency of the Irrigated Production System at the Seed Production Centre in the Mfuti Catchment, Kinshasa, presented by MSc *Jean-Jacques Nzau*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa.
6. Popularization of good agricultural practices adapted to climatic contexts in the decentralized territorial entities of South Kivu, presented by Mr. *Aksanti Kabwanda Nicodeme*, Forestiers du Monde, DRC.
7. Impact of agricultural practices on the concentration of dissolved organic matter, the case of the watersheds of the Yangambi Biosphere Reserve, presented by Mr. *Kasereka Jérémie*, University of Kisangani, DRC.
8. Characterization of irrigation water management systems in the market gardening perimeter of Kimbanseke, lower reaches of the N'djili watershed, presented by Mrs. *Kibamiene Mola Marinette*, University of Kinshasa, DRC.
9. Development of an irrigation system protocol in the N'djili watershed: Case of the Masina Rail 1 rice perimeter in Kinshasa, presented by Ir MSc *Fiston Kayembe*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.
10. The Crucial Importance of Fresh Water and the River for Youth, presented by *Rogho Yasegbaga Benedicte*, International Association of Students in Agricultural and Related Sciences, Kinshasa, DRC.
11. Popularization of good agricultural practices adapted to climatic contexts in the decentralized territorial entities of South Kivu, presented by Mr. *Aksanti Kabwanda Nicodème*, Forestiers du Monde, DRC.
12. Determining factors in the choice of a surface irrigation system in the context of climate change: The case of rice producers at the Masina rail 1 site, N'djili watershed, DRC, presented by Ir *Jean Kalume Shikayi*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.

4.2.4.3. Poster Presentations

1. Analysis of hydro-pedological characteristics for the estimation of rice water needs and the design of an irrigation system for a rice-growing perimeter in the N'Djili watershed, in Kinshasa. Ir. MSc *Fiston Kayembe*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.

2. Water and food security. Mr. *Mokuba Ikla Gradi*, Youth Organization for Innovation and Sustainable Development/OJID, Democratic Republic of Congo
3. Evaluation of the hydraulic performance of a small-scale irrigation system in the N'djili watershed: Case of a drip system. Ir. *Christian Mulembakani Tengua*, CRREBaC, Regional Water School, University of Kinshasa, DRC.
4. Economic modelling of the profitability of a small-scale irrigation system in the context of change. Case of the N'djili River Watershed/DRC. Ir. *Jean Kalume Shikayi*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.

4.2.4.4. Recommendations

The following recommendations aim to support the Congo Basin countries in the implementation of concrete, sustainable and scientifically based solutions to strengthen food security through the development of irrigation, in a context marked by climate change and critical food insecurity (IPC phase 3 and 4).

1. **Develop an Agricultural Irrigation Recovery Plan focused on the DRC and adapted to the regional scale:**
   - Translate the DRC's National Irrigation Development Strategy (SNDI) into an operational action plan, with pilot phases in areas with high agricultural potential.
   - Identify and develop priority irrigation areas with high IPC risk (e.g., Kasai, Great Equator, South Ubangi) to ensure a secure food production base.
   - Link this plan to a regional vision shared with the other countries of the Basin (Congo, CAR, Cameroon, Gabon), particularly in the transboundary basins.
2. **Strengthen applied research on resilient irrigation systems:**
   - Support universities and agronomic centres in:
     - Mapping irrigable land,
     - Characterization of the water needs of local crops,
     - and Hydrological and climatic modelling applied to irrigated perimeters.
   - Generate data to guide science-based decisions (Science for Policy) in irrigation development.
   - Promote low-cost solutions for rural areas: smart solar pumps, gravity drip irrigation, and storage in micro-dams.
3. **Learning from the irrigation successes of some African countries**
   - Draw inspiration from successful policies in Morocco, Egypt, Tunisia, South Africa and Namibia, to:
     - Structuring an irrigation governance model in the Congo Basin (regionalized, participatory, multi-stakeholder).
     - Develop combined financing mechanisms (targeted grants, concessional loans, public-private partnerships).
   - Create irrigation centres of expertise in the agricultural provinces.

4. **Diversifying crops and integrating climate resilience**
    - Launch smart and climate-resilient crop diversification programs, integrating:
        - Strategic nutritional crops such as quinoa, adapted to extreme climatic conditions.
        - Agro-ecological practices adapted to the agroecological conditions of the targeted regions.
    - Integrate dietary habits, cultural realities and endogenous knowledge into extension efforts.
5. **Organising producers to pool investment:**
    - Structure small producers, the main suppliers of agri-food products, into local cooperatives, capable of:
        - Manage collective irrigation facilities,
        - Access to agricultural credit,
        - Be trained in the rational management of water and inputs.
6. **Improving technical and environmental performance:**
    - To assess the economic performance of existing irrigated schemes in the Congo Basin countries.
    - Support the establishment of ecological and economical irrigation systems, adapted to small producers.
    - Promote Artificial Intelligence-assisted irrigation systems to reduce energy vulnerability and optimize water use efficiency in agriculture.
    - Develop effective drainage systems in floodplains with a view to creating suitable agricultural areas.
7. **Mobilize partners for the basin:**
    - Make irrigation a central lever for food sovereignty in regional negotiations (ECCAS, CICOS, COMIFAC).
    - Mobilize technical and financial partners to co-finance hydro-agricultural recovery programs.
    - Include irrigation in the priorities of National Adaptation Plans and National Post-Crisis Recovery Plans.

4.2.5. Thematic area 5. Drinking water, Hygiene and sanitation

4.2.5.1. Specific context of the thematic axis

The Congo Basin has exceptional potential for surface and groundwater, but the management of this water faces many challenges that limit access to public water services. Per capita water consumption is lower than in many arid countries in the Sahel, indicating a significant infrastructure deficit, and can have a negative impact on human development and economic growth. The domestic water supply is very critical in all the riparian countries. Less than 10% of households are connected to the water supply network, and only 26% of the population has adequate access to safe drinking water. Most of the population depends on shallow wells or untreated surface water, and is therefore exposed to serious health risks and high mortality.

The Drinking Water, Hygiene and Sanitation Theme aimed to improve knowledge on water supply infrastructure, the promotion of appropriate hygiene practices in both urban and rural areas, and to reduce the prevalence of waterborne diseases through integrated and community-based approaches. The exchanges in this theme made it possible to elucidate the major challenges related to equitable access to drinking water and dignified sanitation services, but also to identify sustainable technologies for scalable drinking water systems and their resilience to environmental impacts. It also offered an in-depth understanding of the management methods of urban wastewater collection and treatment systems, as well as methodological tools to identify needs, plan interventions and develop sanitation master plans adapted to local contexts. Projections on the future of the Drinking Water, Hygiene and Sanitation sector in the Congo Basin Countries are alarming, but we must get to work now if we are to solve the puzzle. To this end, the countries of the Congo Basin are called upon to plan and execute major infrastructure projects to improve the quality of life; Water, hygiene and sanitation are part of the critical infrastructure of a modern society. To build this infrastructure 20 years before 2050, to be able to provide a minimum of public utility.

4.2.5.2. Presentations Parallel Sessions – Oral Communications

1. Developing an approach for balancing water use and protecting water quality of an urban river ecosystem, presented by Dr. *Zouera Sani Boubacar*, Niger.
2. Phytoremediation of wastewater from state markets before its discharge into the Congo River, presented by Dr. *Mbemba Femme Bout oukanakio*, Congo-Brazza.
3. Lack of monitoring of freshwater flows from the Cu-Co mines discharged into the rivers in southeastern part of the Congo Basin (Katanga Copperbelt), presented by Mr. *Pascal Mambwe*, University of Lubumbashi, DRC.
4. Analysis of the risk of infections caused by the use of the waters of the Funa River in Kinshasa, presented by Dr. *Blaise Mbiala Vodiasilua*, One Health Institute for Africa - University of Kinshasa, DRC.
5. Assessment of Groundwater Storage Depletion using GRACE and Land Surface Models in Mzimba District, North Malawi, presented by *John Sichone*, The Catholic University of Malawi, Malawi.
6. Modelling of flood risks using Geomatics in the city of Douala (Littoral Region, Cameroon), presented by Dr *Emvoutou Huguette Christiane*, University of Douala, Cameroon.
7. Solutions for improving access to non-collective sanitation in two disadvantaged neighborhoods of the city of Douala, Cameroon, presented by Ir *Wefang Wedze Lucrece*, Water and Climate Network of Youth Organizations of Central Africa (RECOJAC), Cameroon.
8. Chemical profiles of seeds and aqueous extracts of seeds of six plant species with coagulant activity in water clarification, presented by Dr. *Hermeline Ntalani Tabuna*, Marien Ngouabi University, Congo-Brazzaville.

9. Optimization of the drinking water distribution network in the city province of Kinshasa: Case of the REGIDESO SA/Ngaliema sector, presented by Ir MSc *Patty Aluda*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa.
10. Application of the method for studying the vulnerability of groundwater to pollution "PRASTCHIM" Case of the alluvial aquifer of the Mitidja, presented by Dr. *Djoudar Née Hallal Dahbia*, Ecole Nationale Supérieure d'Hydraulique, Algeria.
11. Dye effluents polluting African surface water: sources, impacts, physicochemical properties, and treatment methods, presented by MSc *Pachris Kapanga*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa, DRC.
12. General overview of the mobilizable water resources (quantity and quality) of Cameroon in a context of climate change, presented by Professor *Sigha Nkamdjou*, HDR & Professor Fouépé Alain, Research Director, IRGM/Cameroon.
13. Study of the degradation of free chlorine in the drinking water distribution network in order to maintain the quality of water in the network, presented by Professor Jean-Pierre Beya, ISTM-Kinshasa, DRC.
14. Development of a numerical approach for the monitoring of the degradation of water quality parameters in an urban drinking water distribution network: Case of the city of Kinshasa (DRC), presented by Ir MSc *Bouzari Seddik*, ENSH, Algeria.
15. Study of the potability of household water supply sources in the Mbanza-Ngungu health zone, Kongo Central – DRC, presented by MSc *Pascal Kazwenga*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa, and Provincial Division of Fisheries and Livestock of Kongo Central, DRC.
16. The use of artificial intelligence and the Internet of Things (IoT) to optimize sustainable water resources management in urban areas, presented by *Kalume Chadrack*, Mapon University, DRC.
17. Lack of monitoring of freshwater flows from the Cu-Co mines discharged into the rivers in southeastern part of the Congo Basin (Katanga Copperbelt, Democratic Republic of Congo), presented by *Erwan Thanga*, University of Kolwezi, (Kolwezi) DRC.
18. Mapping of the vulnerability of groundwater in the Lukunga watershed in the city of Kinshasa, presented by Ir MSc *Juvenal Matungila*, Ecole Régionale de l'Eau and CRREBaC, DRC.
19. Removal of Antibiotic Sulfamethoxazole from Water using Zeolite/Bi2O3 Nanocomposite: A means of antimicrobial resistance control, presented by MSc *Kapanga Pachris*, Ecole Régionale de l'Eau and CRREBaC, University of Kinshasa.

4.2.5.3. Poster Presentations

1. Design of a hydraulic model coupled with a Geographic Information System (GIS) for the management and monitoring of the drinking water supply network, presented by Mr. *Musanga Matondo Jean*, CRREBaC, Regional Water School, University of Kinshasa, DRC.

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2. Contribution to the spatio-temporal modelling of water quality in water supply networks, (Case of water distribution network in the city of Kinshasa by the N'djili plant in the DRC), presented by Ir. *MSc Seddik Bouzari*, Ecole Nationale Supérieure d'Hydraulique (ENSH).
3. Optimization of the drinking water distribution network in the city of Kinshasa: Case of the Regideso/Ngaliema sector in the city province of Kinshasa, presented by Ir. *Patty Aluda Mayo*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
4. Simulation of consumption scenarios of a rapidly expanding drinking water supply network, and its impact on its functioning, Case of the municipality of Maluku, presented by Mrs. *Mélanie Kabola Banza*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
5. Valorization of effluents from the drinking water production industry into agricultural fertilizer: Case of REGIDESO N'djili in Kinshasa, presented by Mr. *Kianawa Kinakina*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.
6. Towards a combined mobilization of surface and groundwater from the N'djili River basin for the supply of drinking water to Mbanza-Lemba and its surroundings in Kinshasa, presented by Mr. *Juvénal Birikomo Mihigo*, CRREBaC, Ecole Régionale de l'eau, University of Kinshasa, DRC.
7. Exploring the Relationship Between Land-use and Pesticides Contamination in Freshwater Ecosystem: A Case Study of Chanchaga River, Minna, Nigeria, presented

by Ms. *Eunice Ojoma Ikayaja*, CRREBaC, Ecole Régionale de l'eau, University of Kinshasa, DRC.

8. Improving water accessibility in central Africa, presented by Mr. *Kelbe Parfait Marie*.
9. Small and medium size enterprise promotion Agency, Cameroon (no name of presenter specified).
10. Energy scenario of the DRC based on the development of its hydroelectric potential by 2050, presented by Ir. *Benjamin Kibungu Hodia*, CRREBaC, Regional Water School, University of Kinshasa, DRC.
11. Drinking water supply project in the Koulikoro Region, presented by Mr. *Touré Rabia Ounfountera*, Regional Council of Koulikoro, Mali.
12. Quantification and Characterization of faecal sludge in the Funa River watershed for the improvement of management solutions, presented by Mrs. *Marinette M. Bira*, CRREBaC, Regional School of Water, University of Kinshasa, DRC.

4.2.5.4. Recommendations

The main recommendations from the Drinking Water, Hygiene and Sanitation theme to help the DRC and the Congo Basin countries strengthen basic drinking water supply, hygiene and sanitation services.

1. **Drinking water**
    - Support hydrological and hydraulic modelling in the Congo Basin in order to better understand the flows available for drinking water catchments.
    - Regulate the proliferation of boreholes and secure surface water resources, especially river and river water, as borehole water often has a high acidity (pH 4.3).
    - Implement water treatment input manufacturing plants in the Congo Basin member countries.
    - Improve the functioning of the drinking water supply network through the following actions:
        - Implementation of piping manufacturing plants in the member countries of the Congo Basin.
        - Judicious selection of the installation points of the measuring instruments (flow meters and pressure gauges) to optimize the monitoring of the network, particularly in Kinshasa.
        - Realization of a complete mapping of the network of large urban cities of the Congo Basin such as the city of Kinshasa based on operating data and by proceeding to the gradual calibration of the network.
        - Implementation of a program for the renewal of obsolete pipes.
        - Installation of pressure and flow regulators in the short term, and then, in the long term, construction of the balance and head tanks to ensure equitable and stable water distribution.

    - Integration of smart sensors into the distribution network for remote monitoring of pressure and flow, promoting more efficient management.
    - Installation of rechlorination plants to ensure water quality up to the point of use.
  - Strengthen the control and regulation of urban boreholes to ensure the quality and sustainability of groundwater resources.
  - Establish a regional water and sanitation fund for each country in the Congo Basin region.

2. **Hygiene**
   - Promote the improvement of hygiene practices through:
     - The organization of community education and awareness sessions.
     - The promotion of ecological latrines, adapted to local realities.
   - Integrate hygiene considerations into urban planning.
   - Mobilize more financing for the Water Supply and Sanitation (DWSA) sector to support hygiene improvement efforts.
3. **Sanitation**
   - Develop an integrated waste management system, including the collection, treatment and safe disposal of solid and liquid waste.
   - Raise awareness of the dangers of illegal dumping and promote sustainable sanitation practices.
   - Identify and protect groundwater recharge areas to preserve water resources.
   - Strengthen wastewater treatment through the establishment of domestic and industrial wastewater treatment plants in large cities and agglomerations.

4.2.6. Thematic area 6. Water, Society, Health, Private Sector and Governance

4.2.6.1. Specific context of the thematic axis

The Water , Society, Health, Private Sector and Governance Theme explored the institutional, socio-political, economic, health and legal dimensions of water resources management in the Congo Basin. It highlighted the importance of a single, multi-level, inclusive and coherent governance of water resources in the Congo Basin, capable of responding to the growing challenges related to resource scarcity, inequalities in access, conflicts of use, health crises (particularly in a "One Health" approach) and environmental and economic pressures. The information obtained in this theme will help strengthen regulatory frameworks, encourage the active participation of the private sector in the provision and management of water services, and promote the effective engagement of local communities and civil society organizations. This integrated approach lays the foundations for sustainable, equitable and resilient water management, in the service of development, social justice and public health objectives.

4.2.6.2. Presentations Plenary Sessions

1. Governance and Development of Water Resources in the Congo Basin: Schemas of Intelligibility, Issues, Dynamics and Perspectives, presented by Professor *Michel Bisa Kibul*, Researcher in Political Geography and Political Science, Expert in Land Governance, Natural Resources, and Digital Anthropology, University of Kinshasa.
2. The Grand Inga project, international water law and human rights, presented by Professor *Mutoy Mubiala*, Expert-consultant in human rights, transitional justice and conflict resolution, Former Senior UN official.
3. Law No. 15/026 of 31 December 2015 on Water of the Democratic Republic of Congo & Implementation of the Congolese Water Office (OCE): Challenges and Prospects, presented by Ir *Louis Lungu Malutshi*, Director Head of Service of the Directorate of Water Resources, Ministry of Environment and Sustainable Development, DRC.
4. Contribution of the performing arts in public water management policy, presented by Professor *Théo Kaminar*, Academic Secretary General of the National Institute of Arts, DRC.
5. Tracing inclusiveness: A comparative analysis of water governance in Brazil and South Africa, lessons for the Congo Basin, presented by Dr *Amrita Lamba*, Researcher in Inclusive Governance, Migration, Rural and Agricultural Change, Senior Natural Capital & Governance Scientist, Okala, UK.
6. Practical experiences of the PRISE project in the supply of drinking water in rural areas, presented by Ir *Déo Nsunzu*, Coordinator of the PRISE Project, African Development Bank (AfDB).
7. Strengthening socio-economic infrastructure and access to drinking water: An opportunity to improve the living conditions of populations in the Congo Basin, presented by Ir *Bruno Zali-Zali*, Water and Sanitation Expert, African Development Bank (AfDB).
8. Congo Basin Catchment Information System (CB-CIS): A System Thinking Approach to Integrated Management of Large River Basins, presented by Professor *Raphaël M. Tshimanga*, Member of CES/DRC, Co-Chair of the Science Initiative for the Congo Basin (CBSI), Director of CRREBaC.
9. Integrated Watershed Management: A Foresight Interface between Traditional Knowledge and Modern Farming Water Practices for Youth Employment in the Congo Basin, presented by Professor *Cush Ngonzo Luwesi*, AUMT, RC and Ecole Régionale de l'Eau, University of Kinshasa, DRC.
10. Sharing experiences on capacity building in River Science in the Congo Basin through the CRuHM Project: A Support for Decision-Making, presented by Professor *Mark Trigg*, Expert in Water Risks and Deputy Director of water@leeds, University of Leeds, UK.
11. Challenges of fragmented governance of the Congo Basin waters, presented by Professor François *Bokona Wiipa Bondjali*, University of Kinshasa, DRC.

12. Challenges of the legal framework in the regulation of pollution of transboundary watercourses in the Congo Basin: Case of the Kasai River, presented by Professor Aser *Nzovu Luvuji*, University of Kikwit, DRC.
13. Problems of public policies for the management and exploitation of water resources in the Congo Basin: Sensitization of national decision-makers on the issues at stake, presented by Professor *Emile Bongeli*, University of Kinshasa, DRC.
14. Managing the interactions between migration and conflict due to climate change and water to strengthen the resilience of communities in the Congo Basin, presented by Professor *Bernard Lututala Mumpasi*, University of Kinshasa, DRC.

4.2.6.3. Presentations Parallel Sessions – Oral Communications

1. The Congo Basin: Common Heritage of Humanity?, presented by Professor *Didier Nsasa*, University of Geneva, Switzerland.
2. Land reform issues in the DRC, local community involvement and indigenous peoples: challenges and future prospects, presented by Expert *Mbongo Glodie*, Centre for Innovative Technologies and Sustainable Development, Mbandaka, DRC.
3. Hybridization of water governance between local participatory decentralization and regional coordination, presented by Dr. *Hippolyte Ditona*, ERAIFT, DRC.
4. Spatio-temporal evolution of human African trypanosomiasis infection at the scale of health zones in Kwilu province, DRC, 2005 – 2022, presented by *Lambuku Imbimbi Lefilso'o Nze*, One Health Institute for Africa, University of Kinshasa, DRC.
5. Spatio-temporal dynamics of Ebola virus disease in Equateur Province from 2020-2022, presented by *David Zembala*, DPS Ecuador, DRC.
6. Eco-epidemiology of Ebola virus disease epidemics in DR. Congo from 1976 to 2022, presented by Doctor *Elumbu Mbonde Glodi*, One Health Institute for Africa, University of Kinshasa.
7. Spatial and Temporal Dynamics of Monkeypox Epidemics in the DRC 2015-2022, presented by One Health Institute for Africa, University of Kinshasa, DRC.
8. On the existence of natural resources and water governance in mining companies in the Democratic Republic of Congo, presented by CT *Kisimba Kinyanta*, Faculty of Law, University of Lubumbashi (UNILU) & Lawyer at the Bar of Lubumbashi, DRC.
9. Water, sustainable wealth: the problem of water resources in developing countries, presented by Mr. *Glodi Katenga Lifita*, University of Kinshasa, DRC.
10. Local knowledge of mega-gully management, an impact of runoff water in peri-urban areas in Kinshasa, DRC: case of the mega ravine of Sikama Avenue in the Commune of Kisenso, presented by Dr. *Sambieni*, University of Lubumbashi, DRC and ULiège, Belgium.
11. The Congo Basin, an untapped wealth, presented by *Ngoko Yassi Emmanuella Salome*, Human Rights and Democratic Governance, CAR.
12. Strengthening the Climate Resilience of the Water, Sanitation and Hygiene Sector, presented by Fabienne Bertrand, UNICEF DRC.

13. Water Law: Analysis of Governance Policies in the Congo River Basin - Challenges and Prospects, presented by *Mbudi Philippe*, CNOVD, DRC.
14. Scientific awakening on the management of the Congo Basin, presented by Mr. *Didier Aksanti*, Congo Basin Alliance, Tanzania.
15. Socio-economic and environmental importance of the restoration of the So'o River in the Nyong and So'o department, presented by *Mounira Woussafit Mfossi*, Acquasie World, Cameroon.
16. Hydrological Resources of the Great Lakes Region: Opportunity for Development, Peace and Solidarity, presented by *Londa Londa*, Alliance for the Defense of Nature, DRC.
17. Comparative analysis of the legal framework for the transboundary management of peatlands in the DRC and the Republic of Congo in the context of the COMIFAC convergence framework, presented by Mr. *Felix Credo Lilakako*, JUREC, DRC.
18. A trajectory of change in the Lake Guiers basin, Senegal: application of the adaptive systems approach to establish participatory governance for water security, presented by Mr. *Hikimat Saadi*, Cheikh Anta Diop University of Dakar, Senegal.
19. Inter-community relations (Bantu and indigenous) and access to water in the commune of Pokola (Sangha department in the Republic of Congo), presented by Dr. *Maba Ngouloubi Prince Loïque*, Denis Sassou N'guesso University, Congo-Brazzaville.
20. Economic Development and Water Management: Challenges for Societies and Territorial Governance, presented by Ms. *Jennifer Eyeang Ello*, GSEZ, Gabon.
21. Involvement of indigenous pygmy peoples and local communities in conservation and its consequences, presented by Mr. *Bushiri Michel Abraham*, GREPOED, DRC.
22. Contribution of Indigenous Peoples in the Management of Water Resources, presented by Mr. *Kasongo Kadiya Hugues*, University of Kinshasa, DRC.
23. Climate-sensitive diseases, presented by Mrs. *Mfossi Mantechoua Oumou* Sadia, Association of Young Environmentalists of Cameroon.
24. Study of the climatic and environmental factors involved in the occurrence of Mpox epidemics in the DRC from January 2000 to August 2024, presented by Dr. Jean-Clément *Sibo Mana*, One Health Institute for Africa, University of Kinshasa, DRC.
25. Elites and Power in the Management and Governance of Rural Water Supply in Northwest Cameroon, presented by Dr. *Henry Bikwibili Tantoh*, University of Bamenda, Cameroon.

4.2.6.4. Poster Presentations

1. Gender and Climate Change. Mr. *Darie Jipsy Temba Kotanze Zeneth*. Global Eco-village Network GEN-RCA, Central African Republic.
2. Sustainable Water Management and Social Inclusion: Towards Equitable Governance in the Congo Basin. Mr. *Moise Kitete Manala*, Build Peace and Development, Democratic Republic of Congo.
3. Never-ending dispute: Human-Animal conflict. Mr. *Gael Mabanza*, Environmental Activist, DRC.

4. Eco-epidemiology of mpox in the Inongo health zone, 2016-2024. Mr. *Joel Wengi Bondongo*. One Health Institute for Africa, DRC.

4.2.6.5. Recommendations

The thematic session "Water, Society, Health, Private Sector and Governance" highlighted the urgency of responding to the growing pressures on the ecosystems of this strategic region, through a systemic and integrated approach to water resources management. The Congo Basin, the world's second largest reservoir of biodiversity and carbon, is suffering the full force of the cumulative impacts of climate change, unsustainable exploitation of resources, insufficient basic infrastructure, as well as persistent institutional weaknesses. In this context, the main recommendations are as follows:

1. **Water governance and regional cooperation:**
    - To take stock of the effective implementation of bilateral and multilateral agreements for an equitable management of shared resources.
    - Harmonize sectoral policies and laws (environment, land, agriculture, energy, etc.) by integrating specific provisions related to the management of vulnerable aquatic ecosystems such as wetlands and peatlands for a synergy of actions in an integrated water resources management approach.
    - Encourage public-private partnerships to support green innovation and green infrastructure.
    - Establish participatory monitoring and evaluation mechanisms to ensure transparency.
    - Promote inclusive governance based on transparency and risk management.
    - Raise awareness among local authorities to support community initiatives without replacing them.
    - Harmonize and coordinate the interventions of different actors (States, NGOs, communities, donors) to minimize duplication of action and maximize the impact of investments.
    - To take stock of the implementation of national water policies with a view to promoting an enabling environment for integrated water resources management in the Congo Basin countries.
    - Define binding measures for the protection of vulnerable water resource systems such as wetlands, peatlands, aquifers and water sources.
2. **Legal framework and rights of communities:**
    - Strengthen legal texts protecting the rights of indigenous peoples.
    - Promote the inclusion of indigenous peoples and local communities by valuing their endogenous knowledge in integrated water resources management decision-making.
    - Develop conservation programs with restoration of aquatic ecosystems.
    - Strengthen monitoring of illegal practices (toxic fishing, overhunting, illegal mining) to reduce pressure on vulnerable aquatic systems.

- Promote sustainable economic alternatives to reduce pressure on watersheds.
- Involve local communities in participatory water resources management.
- Create capacity-building programs for Indigenous communities.
- Monitor and evaluate public policies affecting inter-community relations.

3. **Infrastructure and innovation**
   - Promote the development of socio-economic infrastructure for improved access to water resources services and social equity.
   - Strengthen health infrastructure in areas with a low well-being index.
   - Promote endogenous knowledge for nature-based innovations and solutions in the management of water resources in the Congo Basin.
4. **Research, Health and Environment**
   - Promote interdisciplinary studies (climate, mapping, modelling, health).
   - Develop an interdisciplinary educational tool (integrating environment, land and forestry law, water governance) to strengthen the capacities of water stakeholders and professionals.
   - Encourage the production of applied research on human development, water governance, greenhouse gas emissions and ecosystem services in the Congo Basin.
   - Strengthen epidemiological surveillance of waterborne and zoonotic diseases such as cholera, monkeypox, etc. by integrating socio-environmental factors.
5. **Population vulnerability**

Flood risks

From the state of play of floods as discussed in the Forum, the need for integrated flood management is crucial to mitigate risks, minimize impacts and strengthen the resilience of populations to these extreme weather events. The ultimate goal is to promote a holistic approach, engaging all relevant actors, from government authorities to local communities, to ensure effective and sustainable flood management in the Congo Basin region. The following key recommendations were made as areas of action:

- Establish a flood forecasting program and an early warning system;
- Develop and implement a subwatershed management plan
- Identify and map areas prone to flooding in order to guide development;
- Delineate safety perimeters around flood-prone areas
- Develop and implement a reforestation plan for degraded watersheds;
- Revitalize and operationalize the structures in charge of hydrological and meteorological monitoring of the Congo Basin;
- Develop and implement a flood-related health risk management plan;
- To develop laws on the protection of security perimeters and charging areas;

- Strengthen cooperation with riparian countries sharing the Congo River Basin for a regional approach to flood risk management;
- To set up a mesologic programme, aimed at studying the interactions between ecological factors, particularly floods, and human populations, in a holistic approach.

Pollution of the waters of the Congo Basin

The Congo Basin is now facing growing threats from water pollution, on a scale unprecedented in the history of the Democratic Republic of the Congo and the sub-region. The immediate consequences observed include massive contamination of surface waters, poisoning and disappearance of aquatic species, an upsurge in waterborne diseases, disruption of economic activities such as fishing and shipping, as well as a critical reduction in access to drinking water and domestic or recreational uses. In the future, the persistence or recurrence of such environmental disasters poses a structural threat to the ecological, health and socio-economic stability of the region. Population growth, the expansion of mining activities, weak regulatory mechanisms and the intensification of climate change could amplify these risks if prevention, response and resilience measures are not implemented quickly. This context therefore requires an urgent mobilization of expertise, resources and political will to implement an effective, sustainable contingency plan focused on the protection of ecosystems and communities. To address this challenge, the following recommendations have been made:

Environmental monitoring and scientific reinforcement

- Launch a regional campaign to sample and analyse water, sediments and aquatic biodiversity (physico-chemical, microbiological, isotopic, toxicological analyses, heavy metals, etc.).
- Equip and strengthen the capacities of national and regional laboratories for the reliable and rapid processing of environmental data.
- Establish and densify a permanent network of hydrological and surface water quality and groundwater monitoring stations.
- Assess the self-purifying capacity of watercourses and the vulnerability of aquifers, particularly around drinking water catchment areas.

Technical and institutional capacity building

- Develop an accelerated train-the-trainer program for actors involved in the monitoring, response and prevention of water disasters.
- Support the operational ramp-up of existing research and surveillance centres, in particular the CRREBaC.
- Create and institutionalize joint units (researchers, NGOs, local authorities) to monitor bioindicators of pollution in critical ecosystems (rivers, lakes, protected wetlands).

Water governance and multisectoral coordination

- Set up a **permanent Integrated Water Resources Management (IWRM) commission** for each strategic basin (e.g. Kasai basin).
- Establish **local water monitoring, early warning and community governance units** , with clear reporting mechanisms.
- Strengthen cross-border cooperation by creating a **mechanism for the shared management of natural resources** involving the countries concerned (DRC, Congo, Angola, CAR, Cameroon).
- Apply the "polluter pays" principle and ensure a strict and immediate ban on polluting discharges into aquatic environments.

Management of health, social and economic impacts

- Mobilize emergency kits for the prevention of waterborne diseases and the social care of affected communities.
- Identify and commission alternative sources of drinking water supply; strengthen the production and distribution capacity of infrastructures (e.g. REGIDESO).
- Assess the vulnerability of affected households and economic sectors; Estimate the costs of damage and restoration needs.
- Deploy integrated rescue teams with a monitoring and evaluation system for interventions.

Preparedness, resilience and retraining

- Raise awareness among local communities, especially vulnerable groups (women, children, farmers), about pollution risks and resilience measures (participatory approach).
- Support the economic conversion of populations dependent on polluting activities, in particular by strengthening sustainable **Income Generating Activities (IGAs)** in agro-pastoral cooperatives.
- Carry out biological inventories in sensitive sub-basins or those exposed to pollutant flows (transboundary mining areas).

Environmental Justice and Institutional Response

- Declare, if necessary, a **state of environmental emergency** in severely affected areas.
- Establish a **national commission of inquiry** and request an **independent international commission** to assess responsibilities and establish reparations.
- Implement and monitor compensation, restoration and environmental justice modalities for affected communities.

6. Vulnerability related to pastoral migration and the resulting climate and water conflicts

The Congo Basin, the world's second-largest river basin, is bearing the brunt of the effects of climate change and land degradation, putting an estimated 120 million people at increased risk. This vulnerability is aggravated by the massive arrival of migrant pastoralist communities from the Lake Chad Basin, seeking new viable spaces in the face of the increasing aridification of their region of origin. This migratory dynamic, accentuated over the last two decades, is fuelling land tensions and conflicts over water use in the northern Congo Basin (DRC, CAR, Cameroon), exacerbated by armed conflicts that are already present. Growing pressure around the Congo Basin to Lake Chad water transfer project is finally reviving the risks of a "water war", a symbol of the growing rivalries over water resources in the region. In this context, the following key recommendations were made:

Strengthening knowledge of climate impacts

- Install synoptico-climatic stations for basic hydro-climatic data.
- Train and equip officers in weather data collection.

Developing resilient infrastructure and practices

- Promote rural hydraulics and water management structures.
- Introduce crops and animal breeds that are resistant to climate change.
- Protect exposed waterways by adopting nature-based adaptation.

Improving governance and regional coordination

- Establish a DRC-neighboring countries cross-border policy on transhumance.
- Setting up an integrated information system (ClimateWaterMigrationConflicts) led by CRREBaC.
- Develop an Integrated Water Resources Management (IWRM) plan.

Mobilizing Financing for Community Development

- Support community-based initiatives to create sustainable economic alternatives.
- Create a special economic zone for the management of the livestock of Mbororo migratory pastoralists.

Monitoring and regulation

- Systematically identify Mbororo pastoralists and their livestock, issue authorizations and create a database.

- Monitor the borders, strengthen the Directorate General of Migration (DGM) with checkpoints.

Harmonize practices and promote inclusion

- Facilitate the transfer of know-how between migrants and host communities.
- Raise awareness on the positive contribution of migrants to local development.
- Direct migrants to planned pastoral sites to avoid uncontrolled dispersal.

Strengthening security and regulation

- Sanction complicity and grievances within local authorities.
- Revoke the status of "climate refugee" to illegal migrants, in accordance with the law.
- Recruit mixed forces (FARDC, PNC, ANR, ICCN, CorPPN, DGM) to secure the region.

Institutionalizing territorial management

- Install security forces trained in Climate-Water-Migration-Conflict issues and equip them with technologies (drones, mapping).
- Create a special economic zone on the DRCRCA border to organize transhumance.
- Attach ICCN to the Presidency to strengthen the protection of protected areas, with a trained and equipped CorPPN.

Developing sustainable agropastoralism

- Create pastoral infrastructure: water points, veterinary centres, grazing areas.
- Advocate respectful agriculture (without land clearing/slash-and-burn), support farmers and disseminate improved seeds.
- Establish local water management and protected area committees involving riparian communities.

Supporting the sustainable management of protected areas

- To produce scientific data on biodiversity and to adopt a standardized research plan.
- Update the maps of protected areas and formalize public-private partnership agreements for their concerted management.

Establishing prevention and mediation mechanisms

- Deploy an early warning system for migration flows.
- Reactivate local commissions for mediation and arbitration of disputes.
- Legislate to regulate cross-border transhumance and facilitate access to education, including veterinary training.
- Establish an inter-institutional group (experts + stakeholders), responsible for guiding resilience policies in the Congo Basin.

5. Conclusion and perspectives

The second edition of the Congo Basin Forum has established itself as a reference platform for regional cooperation and science diplomacy on water-related issues, in a context of increasing pressures on the natural resources of the world's second largest river basin. Designed as a crossroads of knowledge, experience and solutions, this Forum made it possible to strengthen the convergence between scientific efforts, public policies and concrete actions on the ground, with the aim of unlocking the full potential of the services provided by water for sustainable development in the region.

Bringing together more than 843 participants from countries in Africa, America, Europe and Asia, the Forum covered six major thematic areas, ranging from water and climate to governance, energy transition, the blue economy, food security and basic social services. Through plenary sessions, scientific communications, side-events, poster presentations and a Water Fair, the exchanges made it possible to capitalize on the available knowledge, to identify persistent challenges, and to promote innovative solutions adapted to the context of the Congo Basin.

By integrating perspectives from other major tropical basins such as the Amazon, the Lake Chad Basin or those of Southern Africa, the Forum highlighted the urgency of strengthening South-South cooperation, promoting science-based policies, and accelerating the mobilization of sustainable financing to address the intersecting challenges of environmental degradation. climate change, population growth and pressure on water services.

The cross-cutting and strategic recommendations resulting from the Forum reflect a collective will to act. They call for:

- The institutionalization of the Forum as a permanent platform for the interface between science, policy and practice;
- The emergence of an integrated vision of the services provided by water and forests and the structuring of high-impact cross-border projects to strengthen the resilience of ecosystems and communities;
- The systematic integration of scientific knowledge into public policies;
- Strengthening regional governance and multi-stakeholder coordination;
- The anchoring of the Congo Basin leadership in global environmental diplomacy;
- International recognition of the Congo Basin as an essential regulator of the global hydrological, ecological and climatic balance.

More than just a framework for exchange, the Forum has established itself as a strategic lever to bring the voice of the Congo Basin to the international scene, following the example of the Amazon Basin. It embodies a new dynamic of regional cooperation and commitment to equitable, integrated and sustainable management of water resources.

Finally, the strong symbolic gesture of the river hike offered to the international participants reaffirmed the vital and cultural link that unites the peoples to the Congo River, while stressing the urgency of its preservation and enhancement. This deep identity is the basis of a shared vision of a sustainable future for the people of the Basin, and of a common ambition: to make the Congo Basin a global model of sustainability, innovation and solidarity.

6. Acknowledgment

The holding of this Scientific Forum would not have been possible without the decisive support of our technical and financial partners, whom we would like to thank for their commitment to research, capacity building, water governance and sustainable development in the Congo Basin.

We express our deep gratitude to the following institutions, which contributed significantly to the success of this event:

- The Presidency of the Democratic Republic of Congo, for its strategic support to the organization and visibility of this regional event.
- The University of Kinshasa, for its academic leadership, institutional mobilization and logistical support.
- The African Development Bank (AfDB), through the PRISE project, for its financial support and technical support in connection with drinking water in rural areas.
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- The World Bank, through the PASEA project, for its contribution to the financing of the Forum and its commitment to improving drinking water, hygiene and sanitation services.
- The Economic and Social Council of the DRC, for its institutional support in the mobilization of stakeholders and its support for the organization of the river hike offered to international participants, a diplomatic approach to consolidate the achievements of the Congo Basin Forum and strengthen relations between countries.
- The Institut de Recherche pour le Développement (IRD), for its active participation in the scientific steering of the Forum's thematic sessions.
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- The CongoPeat project, for its support in the development of knowledge on wetlands and peatlands in the Congo Basin.
- ACTEDD, for its financial and logistical contribution.

We also express our deep gratitude to all the members of the Organizing Committee and the Technical Secretariat of the Congo Basin Forum, whose constant commitment, scientific rigour and effective coordination have made it possible to hold this Forum. This multidisciplinary committee brought together:

- Researchers and scientists, from national and international universities and research centers, who have ensured the intellectual quality of the contributions and the scientific coherence of the program;
- Field professionals and institutional representatives, involved in the operational management of water resources, who contributed to the articulation of the discussions with the concrete realities of the basin;
- Technical and financial partners, who accompanied the entire process of designing, mobilizing and implementing the Forum;
- Representatives of civil society organizations, whose role has been crucial in ensuring inclusiveness, community participation and the consideration of local knowledge in water governance.

The collective commitment of all parties illustrates the importance of concerted, interdisciplinary and inter-institutional action to address the complex challenges of promoting water resources services in the region.

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