MINISTRY OF SCIENTIFIC RESEARCH AND TECHNOLOGICAL INNOVATION

SCIENCES & TECHNOLOGICAL INNOVATIONS BULLETIN

NATIONAL SCIENTIFIC COUNCIL

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Editorial

Cross-disciplinary research, the driving force behind a more innovative and sustainable DRC

Professor Pius MPIANA TSHIMANKINDA
The NSC President,

Investing in cross-disciplinary research is a gateway to a better future for the Democratic Republic of Congo. Faced with the complex and interconnected challenges of the 21st century, the country has become aware of the need to stimulate innovation and scientific research. It is in this context that the Congolese government and scientific research players play a crucial role in promoting and supporting this cross-disciplinary approach.

This commitment is reflected in the implementation of specific policies and training programs for cross-disciplinary research. The creation of adequate research infrastructures and the training of researchers in interdisciplinary methods and approaches are also among the major initiatives. The launch of a workshop to popularize and raise awareness of measures to be taken in the event of exposure to ionizing radiation by the Minister of Scientific Research and Technological Innovation, Gilbert KABANDA, is a perfect illustration of this desire to reconcile research and the well-being of the population.

Cross-disciplinary research encourages collaboration between researchers from different disciplines, enabling them to share their unique knowledge, perspectives and methodologies to tackle complex problems from multiple angles. This collaborative approach stimulates innovation and leads to new, more effective solutions. The impact of cross-disciplinary research is particularly felt in strategic areas such as agriculture, health, energy and the environment. For example, collaboration between researchers in agronomy, biology and the social sciences can lead to the development of new varieties that are more resistant to disease and drought, or more productive, thus contributing to food security and the fight against poverty. A concrete example of this is our work on mycorrhizae and potatoes.

As Kinshasa undergoes transformation and takes on a new concrete look, scientists are questioning the relevance of this choice and its advantages over traditionally favored flexible or bituminous pavement roads. This question, addressed in the 22nd issue of the Science and Technological Innovation Bulletin, perfectly illustrates the need for cross-disciplinary research to inform urban planning choices and guarantee sustainable urban development.

The success of cross-disciplinary research in the DRC depends on the creation of an environment conducive to collaboration and the exchange of knowledge between researchers. This means promoting an open and inclusive scientific culture, where different disciplines respect and value each other. The creation of research centers staffed by interdisciplinary researchers, and the organization of seminars and conferences to encourage dialogue, are concrete examples of how interdisciplinary collaboration can be strengthened. The inauguration of a series of public events at NIASR, bringing together a number of leading figures from the research world, is a case in point.

As agents of the State, researchers, in all their cross-disciplinary fields have a crucial role to play in promoting good governance.

A concrete example of this is the audit carried out by the Inspectorate General of Finances (IGF) on public companies and establishments. Indeed, the findings of this audit, which lasted over two years, may have important implications for the management of public finances, the fight against corruption and the transparency of institutions. By analyzing the data and contributing their expertise in fields such as economics, law and political science, researchers can contribute to a better understanding of the issues involved in good governance and the identification of concrete solutions to improve the management of public resources.

The 22nd issue of the Science and Technological Innovation Bulletin, by highlighting these elements, emphasizes the cross-disciplinary nature of science and technology, which we have always encouraged because researchers, whatever their field, are involved in a wide range of societal issues and sustainable development.

All in all, cross-disciplinary research is an indispensable tool for tackling the challenges facing the DRC, and for building a more innovative and sustainable future. By encouraging collaboration and convergence between disciplines, the DRC can unleash the full potential of its scientific research and thus contribute to the progress and welfare of its citizens.

Activities of the Minister of the SRTI

NCPIR: Gilbert KABANDA launches workshop on protecting Congolese against ionizing radiation

The Minister of Scientific Research and Technological Innovation, Gilbert KABANDA, presided over a popularization and awareness-raising workshop on measures to be taken in the event of exposure to ionizing radiation, organized by the National Committee for Protection against Ionizing Radiation (NCPIR), from May 20 to 22, 2024 at Sultani Hotel in Gombe township.

The aim of the workshop was to inform the public about the necessary measures to take to avoid falling victim to ionizing radiation. Minister KABANDA pointed out that the Democratic Republic of Congo is rich in minerals, which exposes the population to increased risks of exposure to ionizing radiation. He called for the fight against ionizing radiation to be made a national priority, and for the workshop to be used as an opportunity to raise awareness at all levels.

This campaign," he continues,"concerns not only Katanga but also the other provinces of the Republic, because ionizing radiation is a major problem for public health, animal health and plant health, in both the positive and negative senses.

The President of the NCPIR, Professor NYAMOGA, placed this event in the context of the contribution of this particular structure of the Ministry of SRTI to the Head of State's vision, which calls for the protection of Congolese citizens from harmful effects arising from exposure to ionizing radiation.

"Mining operators need to understand that beyond the purely economic aspect of their activities, there are other aspects that absolutely must go hand in hand with mining operations", he insisted.

He added that the NCPIR should make every effort to ensure that all necessary measures are taken in all provinces.

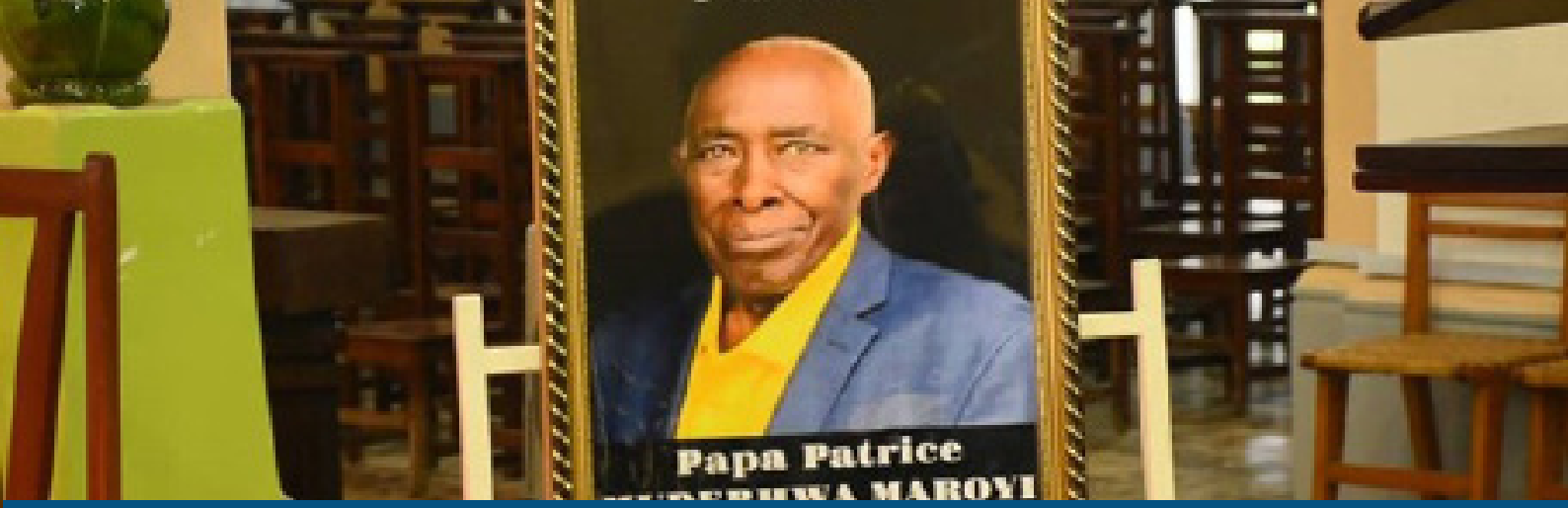
The population should respect the law and regulations on ionizing radiation, which concern several sectors: mining, the brewing industry, cement works and so on.

The President of the National Scientific Council, Professor MPIANA TSHIMANKINDA Pius, pointed out that ionizing radiation is everywhere, but is more concentrated in certain areas, notably mining zones. He called for each mining industry to set up a department responsible for raising public and worker awareness of the effects of ionizing radiation. And that the people who are to be part of this service must be trained to better accomplish this task.

This awareness-raising campaign, initiated by the NCPIR, is a commendable initiative, since it both informs the public of the dangers of ionizing radiation and raises awareness of the means of protecting oneself against it. It is therefore fully in line with the vision of the Head of State, who places the health and welfare of citizens at the heart of his priorities.

NCPIR is the regulatory authority for nuclear and radiological matters in the Democratic Republic of Congo.

Jacques As/NSC



Gilbert KABANDA pays last respects to his brother Patrice MAROYI MUDERHWA

The Minister of Scientific Research and Technological Innovation (SRTI), Gilbert KABANDA, buried his brother, Patrice MAROYI MUDERHWA, in the family vault in Mushekere, in the urban-rural entity of Kasha in South Kivu

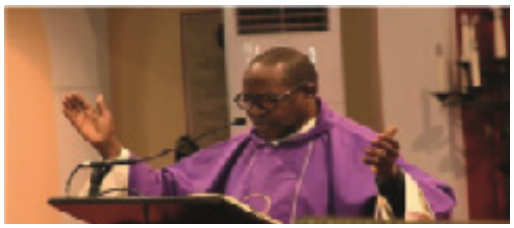
The entrance of former Senate President Prof. Modeste BAHATI and Minister Gilbert KABANDA at the mass celebrated in Kinshasa in memory of the Minister's older brother Patrice MUDERHWA.

Before flying to Bukavu, Minister Gilbert KABANDA and the family delegation organized a thanksgiving mass in Kinshasa at the Sacré-Coeur de la Gombe Catholic church, in memory of his late older brother.

The mass was attended by the South Kivutian community living in the capital, who stormed the Sacré-Coeur de la Gombe church on Wednesday, the day before the trip. Several political, scientific and military figures were also present at the Eucharistic celebration. They included the former President of the Senate, Professor Modeste BAHATI LUKWEBO.

Before concluding, in his funeral oration, the officiating priest implored the grace of God, the Creator, for the repose of the soul of the deceased, Patrice MUDERHWA MAROYI. The

faithful also paid their respects to the illustrious departed.



A mass celebrated in Kinshasa in memory of Patrice MUDERHWA, the Minister's older brother. Gilbert KABANDA

Former Senate President Prof. Modeste BAHATI attends mass in Kinshasa in memory of Patrice MUDERHWA, older brother of Minister Gilbert KABANDA

In closing, the Minister's Chief of Staff, Dieudonné CHIRISHUNGU, thanked the audience on behalf of the KABANDA family for their participation in the ceremony.

MAZONO Christian/NSC and communication unit of the Minister of SRTI

Photo of NSC President, Prof. MPIANA TSHIMANKINDA Pius with some researchers from Research Centers and Institutes

NSC organizes training for AEC researchers

The National Scientific Council (NSC) successfully organized a training session dedicated to researchers from the French Atomic Energy Commission (AEC), from May 08 to 10, 2024 in Kinshasa. This major event featured six renowned speakers: Professor Pius MPIANA TSHIMANKINDA, Chairman of the NSC, Professor WUFELA YAK'OKOLINGO André, Professor Benjamin ZOAWE, Maître Freddy IPUKA, Messrs. Georges MABIALA and Reagan NGOTO.

Professor André WUFELA opened the ball. He set the tone for the course by addressing the crucial theme of "Researchers and the research profession". He highlighted the essential role of collaboration between researchers, stressing that a true researcher is a tireless worker, devoted to his or her discipline and spending most of his or her time in the laboratory, in the field or in the library, confronting theory with reality.

Professor WUFELA also stressed the importance of scientific publications as a means of disseminating research results and promoting the work of researchers. According to him, these publications give greater visibility to the Research Center and to the researcher himself, conferring scientific recognition and even bringing him material gains.

Maître Freddy IPUKA BADJE focused on the "functioning of a Research Institution: role, place and mission of researchers". He defined a research institution as an establishment, laboratory or organization specializing in scientific research, emphasizing its status as a public institution with legal personality.

The speaker emphasized that a public research institution in the DRC is a public establishment with legal personality under the relevant provisions of Ordinance-Law n°82-040 of 5/11/1982 on the organization of scientific and technical research. He pointed out that research activities revolve around the Scientific Division, which includes departments/sections, laboratories and research units/teams. In this context, researchers play a vital role, because you can't talk about a research institution without research activities without a researcher.

Speaking of researchers, he reminded us that they are high-level scientists called upon to work on the design and creation of new knowledge, products, methods or systems. Their main missions are to:

- scientific production
- promoting research results
- dissemination of scientific information
- training through scientific research

The speaker went on to list eleven key qualities that a researcher must possess, including creativity, honesty, rigor, patience, openness, etc...

The first day ended with a talk by Mr. George MABIALA, who addressed two themes: "plagiarism with the plagianism detector software, and responsible management of research data".

The second day was marked by a number of informative presentations, including: an introduction to Mendeley software for bibliographic data management scientific reputation, visibility and marketing of researchers, and the use of bibliometric indicators to measure the impact of research.

One of the highlights of the day was the presentation by NSC President Professor Pius MPIANA TSHIMANKINDA, on the theme of "Writing scientific articles in the natural sciences".

He pointed out that the writing of a scientific article is governed by a set of rules called "Instructions to Authors", which vary according to each journal. He indicated that the structure of a scientific article includes the following elements: title, authors' names (+affiliations+orcid id), abstract, keywords, introduction, materials and methods, results, discussion, conclusion, acknowledgements and bibliographical references.

This second day of training ended with a presentation by Professor Benjamin ZOAWE on the theme of "best practices for a successful PowerPoint presentation".

The third and final day saw four presentations. The first, given by trainer Georges MABIALA, dealt with "Responsible management of research data". The same speaker also dealt with the writing of a research project (case study of a doctoral research project). The third presentation was given by Engineer Reagan NGOTO, who spoke about the valorization of research results under the theme: "From scientist to entrepreneur".

The President of the NSC, Professor Pius MPIANA TSHIMANKINDA, closed the final day by presenting the outline of a research project and indicating that some sources of funding for research

At the end of the ceremony, a training certificate was awarded to each participant to mark the completion of the researchers' training.

The training session organized by NSC was a resounding success for Congolese research, enabling researchers to strengthen their capacities and better understand the challenges of their profession.

The involvement of high-level speakers and the quality of the modules on offer helped to make this event an enriching experience for all participants. By organizing this training course, the NSC has reaffirmed its crucial role in the development of scientific research in the Democratic Republic of Congo.

By supporting researchers and promoting the dissemination of knowledge, it contributes to the emergence of quality Congolese research, capable of meeting the challenges of the present and preparing a promising future for the country.

The AEC's mission is to carry out, promote and coordinate scientific and technological research in various fields of science and industry relating to the use of energy. It is located on the site of the University of Kinshasa in Lemba township. The AEC is currently headed by the General Commissioner, Professor MUANZA KAMUNGA Stève. He is assisted by the Scientific Director, Professor Jérémie MUSUEMA, and the Administrative and Financial Director, Senior Lecturer Tony.

MAZONO Christian/NSC

and Mélanie MUAMINI/AEC

Echoes of Research Institutions

NCPIR raises public awareness of the risks associated with ionizing radiation

From May 20 to 22, 2024, the National Committee for Protection against Ionizing Radiation (NCPIR) organized a workshop to raise awareness and popularize the measures to be taken in the event of exposure to ionizing radiation. the workshop was held at Sultani Hotel, in Gombe township, Kinshasa..

NCPIR President Professor NYAMOGA stressed that his institution had a duty to respond to the Head of State's vision of protecting Congolese citizens from the dangers of ionizing radiation. He insisted on the need to put in place concrete measures to prevent the risks of exposure and guarantee the safety of the population.

"This workshop is of great importance because it will equip you to better protect the Congolese people against the dangers of ionizing radiation produced artificially by nuclear materials and radioactive sources used in industry, mining and research", declared Gilbert KABANDA, Minister of Scientific Research and Technical Innovation (SRTI), in his speech.

He also pointed out that the Democratic Republic of Congo (DRC) is rich in minerals, from east to west and north to south. He called for ionizing radiation to be made a priority.

NCPIR's Director of Regulations, Sylvain TSHIMPAMBA, emphasized that the workshop was placed under the high authority of the President of the Republic. It is placed under the supervision of the Minister of Scientific Research and Technological Innovation. "The objectives of the workshop are to protect human beings in general, and personnel working with radiation, from the harmful and undesirable effects of ionizing radiation. Its mission is to regulate, authorize, control and take coercive measures "he added.

Let's note that the workshop was attended by various users from the mining, brewing, cement, plastic packaging, pharmaceutical, minute cooperation, oil and suture industries. They were made aware of protection measures against the dangers of ionizing radiation.

As the regulatory authority in the nuclear and radiological field in the Democratic Republic of Congo (DRC), NCPIR organized this outreach workshop in application of the relevant provisions of law n°017/2002 of October 16, 2002 and article 404 bis of the mining regulations in force.

NANA/NCPIR

Inauguration of a series of public activities at AIPS: several figures expected in Kinshasa

For an update on activities at the African Institute for Prospective Studies (AIPS), a number of key figures, mostly senior These include Prof. MUBABINGE BILOLO WA KALUKA, Business Continuity Manager, Prof. KALAMBA NSAPO (DR.), Prof. KAMBAYA BWACYA (DR.), Prof. Joseph TSHIBANGU (MR), Prof- BAYIBAYI MOLONGWA (CR), Prof. PINI-PINI (CR), Mr. KANKONDE NKASHAMA , Maître TAFU (ATR), Compliance Officer, Mr. Théodore LUMU MBINGE (Ass.), Communications Officer who are already in Kinshasa to inaugurate a series of NIASR public activities for this second quarter of 2024.

A small timetable will be implemented for a real relaunch. The May events will include the vernissage of Prof. KABONGO MALU's book, Globalization versus Africa: Weapons of Mass Destruction and the Need for a United States of Black Africa (2024), and Prof. PINI-PINI SASAY's book on the Role of Diagnostics in African Emergence.

From Cosmic Thought to Human Intelligence (2024), as well as a series of scientific conferences on the African Renaissance and a seminar to be organized in collaboration with UNIKIN, AIPS and the National University of Equatorial Guinea.

On this occasion, the team will focus on adopting the strategic plan, updating the organization chart and declarative list, streamlining administration and evaluating AIPS's assets and litigation.

This was followed by the vernissage of Prof. MOLONGWA BAYIBAYI's book on Pharaonic African Religion, several other conferences and television programs on African sciences, culminating after AIPS's 35th anniversary in a first-ever Congress of African Egyptology and the first International Colloquium on African Perspectives...

Théodore Lumu, AIPS

Reflections of our researchers

Kinshasa: Concrete roads, mirage or necessity?

Kinshasa is taking on a new concrete face. More and more of the Congolese capital's roads are swapping their traditional bitumen for concrete pavements, prompting questions and debate. Liberation Avenues, Patrice Lumumba, Colonel Mondjiba, Colonel Kokolo, of the Gombe, of Peace, of Independence, of Huileries, of the Commerce, of the Tourism, of the university or Nguma - the list of urban arteries proudly displaying concrete dividers or paving stones continues to grow.

But is this choice justified? Does it really offer any advantages over the soft pavement or bituminous roads so long favored? These are the questions on the minds of the people of Kinshasa, to which clear, objective answers are urgently needed. For beyond aesthetics, it's a question of the future of our roads, the sustainability of our infrastructures and, ultimately, the well-being of all our citizens. A hotly debated topic that deserves in-depth analysis and open discussion.

The Science and Technological Innovation Bulletin took a closer look to examine the issue with a scientific eye. Our aim? To provide clear and objective answers to the questions surrounding this urban development choice. After all, road building is more than just an aesthetic choice: it represents a major investment in a city's development. Roads improve quality of life by facilitating travel and stimulating economic activity. But what is the most suitable material for these vital infrastructures? Does concrete really offer any advantages over traditional flexible pavements?

The choice of the most appropriate pavement type for a given road depends on various factors, such as anticipat-

ed traffic volume, local climate, available budget and aesthetic preferences.

In Kinshasa, some residents used to asphalt roads find it hard to accept concrete roads.

Bituminous roads do indeed offer certain advantages, such as relatively lower cost, greater flexibility, ease of maintenance, noise reduction, lower environmental impact and more attractive aesthetics. However, these roads also have disadvantages, such as low durability, the need for more frequent resurfacing or susceptibility to damage caused by extreme temperatures, all of which need to be taken into account in the particular context of Kinshasa.

The city of Kinshasa is located in the Congo Basin, a region of Central Africa whose Köppen-Geiger Aw-type climate reflects its characteristics, with year-round warm temperatures (mean annual temperature of 25.3°C), a marked rainy season and a distinct dry season.

The city is no exception to the effects of global warming, with all its consequences: climate disruption, flooding, increased heat, etc. All this against a backdrop of economic fragility in a country plagued by armed conflict. In such a context, concrete roads offer several advantages.

From an environmental and climatic point of view, the absorption coefficient, a measure of a material's ability to absorb solar energy, highlights crucial differences between concrete and asphalt. Asphalt, with a coefficient of between 0.85 and 0.95, absorbs a large proportion of the sun's energy, while concrete, with a coefficient of between 0.40 and 0.70, absorbs much less. As a direct consequence, black asphalt roads, which are more absorbent, tend to be warmer than white concrete roads. This impacts on user comfort, air quality and the performance of pavement materials. But that's not all. Roads with high absorption coefficients, such as asphalt, generate more runoff than roads with low coefficients, such as concrete. This favors flooding and erosion, two major problems in Kinshasa, a city located in a river basin and subject to heavy rainfall. Choosing concrete for Kinshasa's roads could therefore have a positive impact on the environment and climate. By reducing the absorption of solar energy, concrete roads help limit the urban heat island effect and improve air quality. What's more, by reducing runoff, they reduce the risk of flooding and erosion.

In terms of durability and strength, concrete roads can last up to 50 years, while asphalt roads only last 15 years on average, if properly maintained. This means that concrete roads require less maintenance and repairs, which can save money in the long term. We also know that Kinshasa is a city with heavy traffic, including many heavy trucks. Concrete is much more resistant to loads than asphalt, which means it is less likely to crack or warp under the weight of traffic.

In addition, as Kinshasa has a tropical climate with intense rainy seasons, and concrete is more water-resistant than asphalt, it is less likely to be damaged by flooding or run-off. This is particularly important in low-lying and flood-prone areas. The choice of concrete for Kinshasa's roads is not limited to durability and strength.

From an economic and ecological point of view, concrete roads also offer considerable advantages.

Although concrete is more expensive to install than asphalt, its longevity and reduced maintenance requirements make it an attractive investment.

From an economic and ecological point of view, concrete roads also offer considerable advantages.

Although concrete is more expensive to install than asphalt, its longevity and reduced maintenance requirements make it a profitable long-term investment.

Concrete production encourages the use of local materials reducing the environmental impact of transport and supporting the local economy. The construction and maintenance of concrete roads generate fewer greenhouse gas emissions than tar roads, helping to combat climate change.

Concrete is a sound economic and ecological choice for sustainable and responsible infrastructure in Kinshasa. However, it is important to note that concrete roads are not necessarily the best solution for every situation. The choice of road surface depends, as mentioned above, on various factors, such as traffic volume and climatic conditions, budget and local preferences

Kinshasa's concrete roads have undeniable advantages in terms of durability and strength. However, it's important not to overlook certain drawbacks. Concrete tends to amplify vehicle noise, which can be annoying for local residents. In addition, concrete is more difficult and expensive to repair than asphalt, which can affect the aesthetics of roads.

It's crucial to qualify this choice, as concrete is not the universal solution. Kinshasa must therefore carry out an in-depth analysis to identify the type of pavement best suited to each situation. An informed and nuanced choice will enable the Congolese capital to benefit from the advantages of concrete while minimizing its disadvantages.

Dr BALOGIJE SELENGE Jean-Luc
RCDM/Bunia

Goma: Mycorrhizae and potatoes, a winning duo to boost production!

Researchers at INERA Walikale in the Democratic Republic of Congo (DRC) have carried out a promising study on the effect of bio fertilization with mycorrhizae on potato production on volcanic soil in Goma.

Engineers MUHINDO BALENGEKE Sylvain and MBURA KIKANDI Germain from INERA Walikale in North Kivu, have carried out a quasi-experimental study on the impact of the interaction between mycorrhizal soil under Eucalyptus, combined or not with cattle manure and mineral fertilizers, namely DAP and NPK, and the different types of soil.

DAP and NPK, and different potato genotypes (Kinigi and PNAP) on tuber growth, yield and quality on volcanic soil in Goma.

The conclusions of their work demonstrate several elements, including:

- Improved growth and yield: mycorrhizae, symbiotic fungi, promote better growth and higher yields in potatoes, particularly in the PNAP genotype.
- Optimized tuber quality: tuber diameter increased significantly, particularly on the PNAP genotype, with the use of mycorrhizae and NPK fertilizers.
- Preserved soil: the application of mycorrhizae limited the increase in soil pH after cultivation, contributing to its long-term preservation.

Based on these results, a number of recommendations were formulated for farmers, including:

- Adopting biofertilization with mycorrhizae: the study demonstrates the effectiveness of this technique in boosting potato production on Goma's volcanic soils.
- Choosing the right combination: to maximize results, we recommend applying mycorrhizal soil in combination with NPK fertilizers for the PNAP genotype and with DAP for the Kinigi genotype.

This research is paving the way for more sustainable and productive agriculture in the Democratic Republic of Congo, particularly in the Goma region.

BALOGIJE SELENGE Jean-Luc

RCDM/Bunia

Discovering Budget - Program under the 2011 Organic Law on Public Finance in the DRC

Under the new law, a "program" is a coherent set of actions grouping together credits for a given ministerial sector. To achieve this, a number of key elements need to be taken into account, notably results orientation. In this respect, unlike the traditional budget, which focuses primarily on the financial allocations for each ministerial sector, the program budget thus focuses essentially on the results to be achieved: public resources are only allocated according to the objectives to be achieved, rather than in terms of the activities to be undertaken

Under the new law, a "program" is a coherent set of actions grouping together the credits earmarked for a given ministerial sector. To achieve this, a number of key elements need to be taken into account, notably results orientation. In this respect, unlike the traditional budget, which focuses mainly on the financial allocations for each ministerial sector, the program budget puts the emphasis on results,the program budget thus focuses primarily on the results to be achieved: public resources are allocated solely in terms of the objectives to be achieved, rather than in terms of activities to be undertaken.

Under the new law, the changeover to program budgeting was scheduled for January 1, 2019. However, this date was not kept, and the government imposed a first moratorium of 5 years, i.e. 2023, then a second of 5 years, i.e. 2028, following the failure to comply with the methodological stages prior to the changeover. These steps included the structuring of budget programs and the implementation of a capacity-building approach for the players involved. The important thing remains that this transition to program budgeting offers many advantages for the DRC, including better allocation of resources, increased accountability of players and improved performance of public services.

It is important to remember that the Program budget places greater emphasis on sound management of public resources and its alignment with the materialization of previously agreed objectives. As a result, performance assessment is required to measure progress towards expected results, which means that managers have to face up to their responsibilities rather than simply being managers of public resources. The focus is clearly on results, transparency and accountability in the use of public resources. In this way, citizens can better understand how their money is being spent, and democratically assess whether objectives are being met.

Program budgeting makes it possible to prioritize resources according to the country's development needs and priorities. In this way, we can optimize the allocation of limited public resources to those sectors where they are likely to have the greatest impact.

This approach is also more flexible.

In fact, public resources can be reallocated during the course of the year according to changing needs or results achieved to date. There's clearly greater adaptability.

The program budget differs from the means budget in that it is results-oriented. It involves allocating budgetary resources to programs rather than institutions, and making players accountable on the basis of results achieved.

This is a major change in the way public finances are managed, and its complexity cannot be overlooked, requiring the mobilization of substantial human and financial resources.

A final word on the concrete innovations of this transition to program budgeting, notably in the way budgets will be designed, managed and evaluated.

Here are some details of the main innovations:

- The principle of budgetary sincerity, which implies that the budget should be a true and faithful reflection of the economic and financial reality of the public entity concerned. This means that budget forecasts and data must be honest, transparent and based on realistic information;
- The notions of "Program" and "Allocation" in the program budget embody a programmatic rather than administrative approach. Clearly, public resources will no longer simply be allocated to ministerial sectors or specific departments, but will be earmarked for specific programs, designed to achieve clearly defined objectives and results. These budget allocations will be made in such a way as to achieve.
- optimal allocation of resources according to strategic priorities.
- The preceding budgetary orientation debate (DOB) will be based on the multi-year expenditure planning document (DPPD). In this way, the DOB will be a democratic exercise in which the public authorities discuss the major budgetary orientations before drawing up the budget. The DPPD will serve as a reference document for these debates, presenting multi-year projections of public spending. This practice will help strengthen transparency and accountability in the budgetary process, by enabling an informed debate on the country's budgetary priorities and choices.

These innovations will undoubtedly improve public resource management by introducing principles of transparency, accountability and efficiency in the allocation and use of public resources.

However, it has to be admitted that this transition to program budgeting involves a number of issues and challenges, particularly in terms of institutional capacity planning and results monitoring and evaluation, which are far from having been satisfactorily met.

In addition, there is the thorny question of the cultural change that this implies, with a profound sensitization of all the players involved so that they fully adhere to this approach. Surely, this is what will best guide public policy towards the achievement of our strategic objectives, and strengthen democratic control over all procedures involving public money.

It should be noted that while the adoption of the Program Budget represented an important step forward in financial governance in that it promotes sustainable development by focusing on the achievement of tangible results in key sectors of public life, its success will depend on the ability of public authorities to effectively implement this approach and overcome potential challenges encountered along the way.

Prof. Floribert NTUNGILA NKAMA
Financial Advisor to NSC

The health benefits of chili pepper

The British channel BBC Africa recently published on its website a scientific article on "the unsuspected health benefits of chili", the main points of which are set out below. Chilies are found in cuisines the world over. Whether red, green, orange or yellow, chilies - one of the world's most widely consumed spices, taste great, have unsuspected health benefits and are recommended by nutritionists.

Chili, a universal ingredient with unsuspected health benefits

Found in cuisines the world over, chilies - whether red, green, orange or yellow - stand out not only for their spicy flavor, but also for their health-giving properties. A recent article published on the BBC Africa website highlights these unsuspected benefits, hailed by nutritionists.

Chilies are actually the name given to plants from the Solanaceae family, whose fruit is used as a condiment or vegetable. It's known for its pungency. And there are more than 200 varieties of chilies, grouped into 5 species, according to dietician, nutritionist and specialist in food hygiene and quality, Dr. Mathieu Tobossi. He points out that the differences lie in the shape, color, pungency and size of this spice. It should be noted that the pungency of chilies is linked to the presence of a component called capsaicin, which gives the spice its strength.

Peppers with capsaicin at level zero (bell bell pepper, for example), level 1 (kaprika), level 2 (hot pepper), level 3 (hot pepper), level 4 (hot pepper), level 5 (hot pepper), level 6 (hot pepper/cayenne), level 7 (hot pepper/arbol), level 8 (bird pepper), level 9 (volcanic pepper/tabasco) and level 10 (explosive pepper/abanero).

The therapeutic virtues of hot pepper

This fruit is highly concentrated in micronutrients with numerous minerals and trace elements, making chili a formidable ally in slimming diets.

Nutritionist Tobossi spoke in particular of the red pepper (cayenne), which is said to have many more virtues. According to some studies, chilies, particularly cayenne, help relieve pain and improve performance in athletes. It's a spice that helps normalize and control blood sugar levels.

"All these elements enable chili to promote fat burning and reduce fatigue," said Dr. Tobossi, who added that it's also an element that effectively combats oxidative stress.

According to him, chili stimulates the appetite and promotes blood circulation due to the presence of capsaicin. It is recommended for people who suffer from indigestion and belly bloating. It is also an effective antibacterial, relieving muscular tension and pain.

The nutritionist spoke in particular of the red pepper (cayenne), which is said to have many more virtues. "It has the virtue of significantly reducing pain due to arthritis, rheumatism, stiff neck, cramps and backache," he added. "Studies have shown that regular consumption of hot pepper is associated with a reduced risk of death from cardiovascular disease", he insisted.

There are a number of prejudices about chilies, which the specialist wanted to dispel from the outset. Many believe that chili is the cause of the ulcer problem that many people suffer from. There is also talk of hemorrhoids being linked to this spice. The latter dismisses these assertions out of hand, pointing out that chilies actually protect the stomach against peptic ulcers by reducing gastric acid.

The dietary therapist also pointed out that chili boosts intestinal health in relation to transit. The progression of matter through the intestine and its undulation can be helped by chili.

However, he advised those who already have ulcers to avoid eating chili, as "it can increase pain" in the stomach. Dieticians say there's no danger in eating chili, except that it shouldn't be abused by excessive consumption, because it can irritate the gastric or intestinal mucosa.

N.T/Tropical Storm

Waste electrical and electronic equipment poses a threat to human health and the environment

Waste electrical and electronic equipment is the world's fastest-growing solid waste stream. A briefing note from the World Health Organization (WHO) indicates that e-waste recycling activities can have several adverse effects on human health. Children and pregnant women are particularly vulnerable.

According to estimates by the ILO (International Labor Organization) and the WHO, millions of women and children working in the world's informal recycling sector are at risk of exposure to e-waste. Lead is one of the most common substances released into the environment when e-waste is recycled, stored or landfilled through inferior activities such as open burning.

The ILO estimates that in 2020, 16.5 million children were working in the industrial sector, of which waste treatment is a sub-sector.

Every year, millions of electrical and electronic appliances are discarded when products break or become obsolete.

These discarded devices are considered e-waste, and can become a threat to the environment and human health if not properly treated, disposed of and recycled.

Common devices found in e-waste streams include computers, cell phones and large household appliances, as well as medical equipment. Every year, millions of tons of e-waste are recycled using ecologically irrational techniques, and are probably stored in homes and warehouses, thrown away, exported or recycled in inferior conditions.

When e-waste is processed through inferior activities, it can release up to 1,000 different chemicals into the environment, including harmful neurotoxins such as lead. Pregnant women and children are particularly vulnerable due to their unique exposure pathways and state of development.

E-waste is considered hazardous waste, as it contains toxic materials or can produce toxic chemicals when improperly treated. Many of these toxic substances are known or suspected to be harmful to human health, and several are among the ten chemicals of public health concern, including dioxins, lead and mercury. Inadequate recycling of electronic waste poses a threat to public health and safety.

Poor practices at e-waste processing sites

Electrical and electronic devices contain many different toxic substances. Although it is unlikely that users will come into contact with any of these substances when the equipment is in use, when the equipment becomes waste, these toxic substances can be released into the environment if the equipment is managed according to ecologically irrational practices and activities.

Several bad practices have been observed at e-waste processing sites: digging in garbage dumps; dumping on land or in waterways; dumping with ordinary waste; open burning or heating; acid baths or acid leaching; stripping and shredding plastic liners; manual dismantling of equipment. These activities are considered hazardous to the environment and human health, as they release toxic pollutants that contaminate the air, soil, dust and water at recycling sites and in neighboring communities. Burning or heating is considered one of the most dangerous activities because of the toxic fumes it produces. Once in the environment, toxic pollutants from e-waste or produced by irrational recycling activities can travel great distances from the point of pollution, exposing people living in remote areas to substances harmful to their health.

N.T/Tropical Storm

Technology in 2025: Get ready for the fourth industrial revolution

The rhythm of technological change is accelerating. It is unpredictable and unprecedented. As the World Economic Forum attests in its report on the future of employment, we are entering a fourth industrial revolution.

Advances in previously little-known fields such as artificial intelligence and machine learning, robotics, nanotechnology, 3D printing, genetics and biotechnology are synergistic and mutually amplifying. Before long, more than a third of the basic skills required for most jobs will be skills that are not yet considered essential for today's jobs.

In this new industrial revolution, the secret to survival lies in anticipation. This requires two key elements of the agile enterprise: awareness of disruptive technologies, and a talent development plan capable of optimizing them.

10 technologies that will transform the global economy by 2025

There are so many emerging technologies on so many fronts that it's hard to keep up. Each breakthrough becomes "the discovery that will change everything».

According to a report by The McKinsey Global Institute and the insights of experts Pluralsight, have compiled a list of the 10 technologies that will lead the fourth industrial revolution. As the McKinsey Institute points out, "Not all new emerging technologies will transform the corporate or social landscape, but some do have the potential to disrupt the status quo, change the way we live and work, and reorganize value fields.»

1. Mobile Internet

Interfaces, formats, sensors and applications will evolve alongside the mobile computing devices that dominate Internet connectivity. By 2025, an additional 4.3 billion people could have access to mobile connectivity.

2. Artificial intelligence

Machine learning and user interfaces, such as speech and gesture recognition technology, will evolve to improve productivity or eliminate some of the knowledge work.

3. Virtual and augmented reality

Goldman Sachs is betting that the virtual and augmented reality market will be worth $80 billion by 2025 (today it's worth around $7 billion). Significant upgrades will be made to the technological infrastructure, and an ecosystem of applications will emerge for both consumers and businesses.

4.Cloud technology

One of the most trending words of the last decade will continue to impact the next. Almost all web and IT service applications could be delivered via the cloud. With cybersecurity on the rise, more and more companies are using the public cloud.

5. The Internet of Things

More than 9 billion devices are currently connected to the Internet, and it is estimated that this figure will rise to between 50 billion and 1 trillion over the next ten years. Companies will need to monitor and secure products, systems, devices and even users.

6. Advanced robotics

Advances in artificial intelligence, machine vision, sensors, motors, hydraulics and materials will change the way products and services are delivered. We will see a surge in technological talent in the creation, operation and maintenance of advanced robots.

7. Biometrics

A recent survey of security professionals revealed that 72% of companies plan to do away with traditional passwords by 2025. New authorization services will therefore emerge for face, voice, eye, hand and signature identification.

8. 3D printing

3D printing could enable unprecedented levels of mass customization and significantly reduce supply chain costs, generating an estimated economic impact of between $230 and $550 billion annually by 2025.

9. Genomics

Die Gentechnik wird sich ank immer leistungsfähigerer Computer noch weiter entwickeln. DNA sequencing and subsequent analysis help reduce local production.

10. Blockchain

Blockchain is best known for the virtual currency Bitcoin, but a recent report revealed 64 different use cases for the technology in 200 companies. Its commercial use will result in streamlined, secure contracts and transactions.

These technologies could bring considerable benefits to many companies, but they will also generate major problems.

The McKinsey report offers a number of suggestions for preparing for these challenges, with a particular focus on anticipating future needs through employee training: "The nature of work will continue to change, and this will require robust education and retraining programs..»

www.pluralsight

PUBLIC-SECTOR RESEARCH CENTERS AND INSTITUTES IN THE D.R. CONGO

RIHS (Research Institute in Health Science)

Objective: To improve the state of health of the population through research in the following fields: pharmaceutical, medical, anthropological, psychological or socio-cultural.
Address: 9, Av. Lukusa C/Gombe; E-mail: dnyembo@gmail.com; Tel: 0824580211

ATSRC (Applied and Technologic Sciences Research Center)

Objectif: Mettre au point des matériaux , des appareils , des méthodes ou procédés Objective: To develop materials, equipment, methods or processes with a view to finding solutions to the population's urgent problems in various fields: housing, rural development and the modernization of the society.
Address: 106, Blvd du 30 Juin, C/Gombe; E-mail: Jeannoel.mputu@gmail.com; Tel: 0821138261

RCHS (Research Center in Human Sciences)

Objective: To ensure the human development of the Congolese people through the study of its social, economic and political dimensions with a view to identifying the factors that have a positive or negative influence on its development.
Address :33,Av.comité urbain C/ Gombe; E-mail: mingashang@yahoo.fr; Tel: 0819377821

RCMT (Research Center in Mathematics Teaching)

Objective: To carry out research in the field of mathematics teaching with a view to improving quality.
Address: 84, Av. des Ambassadeurs C/ Gombe; E-mail: mabelamatendorostin@gmail.com; Tel: 0815031877

GRC (Geophysical Research Center)

Objective: To provide the country with a national geophysical observation network, for the global study of the internal behavior of the earth in the DRC.
Address: 44, Av. de la démocratie, C/ Gombe(within GMRC); E-mail:tondozi@gmail.com; Tel: 0854426228

AIPS (African Institute of Prospective Studies)

Objective: To carry out forward-looking studies in order to propose solutions to crises and problems linked to the evolution of African societies.
Address: Av. Cardinal Malula, C/ Lemba; E-mail: mgrtarcibangu@yahoo.fr; Tel: 0996658741

MDRC (Multidisciplinary Development Research Center/Matadi)

Objective: To carry out operational research in central Congo in the field of applied linguistics of African cultures and applied sciences
Address :Hôtel de la porte Matadi; E-mail: Mwanzanicolas5@gmail.com; Tel:0815037949

NCPIR (National Committee for the Protection of ionizing Radiation)

Objective: - Regulatory authority for protection against the dangers of ionizing radiation in the DRC management of radioactive sources of radioactive materials such as uranium.

Address: 4675, Av. Colonel Ebeya, Immeuble Quitus 2ème niveau; Email: Flory1963@gmail.com; Tel: 0816684665

AEC (French Atomic Energy Commission)

Objective: To carry out, promote and coordinate scientific and technical research in various fields of science and industry, concerning the use of atomic energy and space research.
Address: UNIKIN building; E-mail: Steve.muanza.kamunga@gmail.com; Tel: 0808643248

CGI (Congo Geographic Institute)

Objective: Production of the base map of the DRC at a scale of 1/50,000 and its derivatives.
Address: 106, Blvd du 30 Juin, C/Gombe; E-mail: Fidele.balibuno@unikin.ac.cd; Tel: 0974449240

GMRC (Geologic and Mining Research Center)

Objective: To carry out studies and analyses to improve knowledge of the soil and subsoil of the national territory.
Address: 44, Av. de la démocratie, C/ Gombe; E-mail: rolandkakule@gmail.com; Tel: 0851506161

NIASR (National Institute for Agronomic Study and Research)

Objective: To promote the development of agriculture in the Congo. To maintain varieties, multi-local trials, and its farmers, management and conservation of germplasm.
Set up a program to monitor and evaluate research activities.
To disseminate new varieties. Give the emerging technical department
its reason for being, with a view to producing basic and pre-basic seed.
Resume publication of the agricultural magazine to disseminate research results.

Address: 13, Av. des Cliniques, BP :2037 KINSHASA , C/Gombe; E-mail: domikankonde@yahoo.fr; Tel: 0818248620

RCALC (Research Center into African Language and Culture)

Objective: To coordinate and carry out all research projects concerning African languages and cultures.
Address: 53 C, Av. Makiso, blvd du 30 juin, Kisangani/ Tshopo. Tel: 0851934320

AFRC (Agro-Food Research Centre/Lubumbashi)

Objective: To identify processes for processing and preserving basic local agricultural products.
To improve the quality of imported or locally produced foodstuffs by applying approved standards and quality control.
Help the technological development of the existing agro-industry by providing them with technical assistance wherever possible.
Address: 1, Av. Président ILEO, Q/CRAA, C/Lubumbashi; E-mail: Julesnkulu@gmail.com; Tel: 0997131002

SSRC (Social Science Research Center / Bandunduville)

Objective: to carry out practical scientific research into major socio-economic and cultural issues.
To promote sustainable aquatic development.
Address: 29, Av. de la mission, Q/Salongo, C/Basoko. BANDUNDUVILLE, BP. 223; E-mail:akuzituka@gmail.com; Tel: 0815898971

FERC (Forest Ecology Research Center /Mabali)

Objective: Scientific research on plants, aquatic species and animal species.
Address: D.S/MBANDAKA D.S/MBANDAKA/PROVINCE OF ECUADOR; E-mail: bosomboependi2@gmail.com; Tel: 0825241704

NDRC (Nutritional Diseases Research Center/Gemena)

Objective: Research into diseases linked to malnutrition, such as related diseases by isolating certain molecules, such as SYZYSIUM GUINESIE to combat amoebic yeasts and diarrhea in South Ubangi.

Address: Mobutu n° 220/A. GEMENA/ SOUTH UBANGI PROVINCE; E-mail: cherusangi@yahoo.fr; 0992416091

NSRC (Natural Sciences Research Center /Lwiro)

Objective: To carry out, promote and coordinate research in the fields of science, technology and industry throughout the DRC.

Address: LWIRO LWIRO , TERRITORY OF KABARE/SUD KIVU; E-mail: robert.kasisi@umontreal.com; Tel: 0996806699.

MDRC (Multidisciplinary Development Research Center /Bunia)

Objective: To carry out operational research in the north-east of the DRC in the fields of applied linguistics, African cultures and applied sciences.
Study of nature, fauna, flora and protection of endangered species.

Address:BUNIA/ITURI; E-mail: Kermwathomas@gmail.com; Tel: 0997717070

HRC (Hydrobiology Research Center in Uvira)

Objective: To program, coordinate and monitor research activities in hydrobiology, limnology and hydrology.
hydrobiology, limnology and fisheries in all ecosystems.

Address: 115, AV. du Congo, Q/Kimanga, C/Kalundu, UVIRA / SUD KIVU; E-mail: bidakamuhoza@gmail.com; Tel: 0997716307.

CoE/CBRNEC (Chemical, Biological, Radiological and Nuclear Excellence Center)

Objective: To contribute to the mitigation of chemical, biological, radiological and nuclear risks.

Address: 106, Blvd du 30 Juin, C/Gombe; E-mail: Odette.kabena@gmail.com; Tel: 0816904370.

GVO (Goma Volcanological Observatory)

Objective: Prevention of volcanic risks by monitoring volcanoes and Lake Kivu. Kivu; Management of natural risks; scientific research.

Address:142, Avenue Du Rond Point ; Quartier Les Volcans ; Commune de Goma ; Ville Goma; North-Kivu; E-mail: mavotulu@gmail.com; Tel: 0998584734

WERC (Water and Environment Research Center)

Objective: To serve as a training and research center focusing on water and environmental management.
To propose solutions to problems that could arise around water. Create a national network of Congolese scientists and researchers to analyze and disseminate information on the impact of climate change in the DRC. Promote education and the right to the environment.

Address: 44, Comité Urbain C/ GOMBE; E-mail: ngelipatience@gmail.com; Tel: 0818105625.

RCSARP (Research Center for the Selection and Adaptation of Ruminants and Pigs)

Objective: To carry out studies and research in the field of ruminant and pig breeding

Address: 45, Av. Lumumba, Q/de la gare, LUPUTA/ KASAI-ORIENTAL; E-mail: tshamalagabriel@gmail.com; Tel: 0851817370

NCRS (National Center for Remote Sensing)

Objective: Research in remote sensing.
Address: PLACE ROYAL IMMEUBLE PLACE ROYAL IMMEUBLE KASAI; E-mail: davidngindub@gmail.com; Tel: 0815103502

NCROS (National Center for Research in Oral Science)

Objective: To carry out studies and research in the field of oral health.
Address: 13, 10ème Rue, Industriel Quarter, C/Limete; E-mail: Cnrsbd.rdc.@gmail.com; Tel: 0822244152; 0811835159; 0840922982

CAS(Congolese Academy of Sciences)

Objective: Promotion and dissemination of science, technology,arts and letters. Support for inventive initiatives.
Address: Sciences Faculty/ UNIKIN local 28; E-mail: jjmuyembet@gmail.com; Tel: 0813330242

MIPRC (Matadi Interdisciplinary Pedagogical Research Center)

Objective:--Information science.
Address: The buildings of the Matadi Higher Pedagogical Institute; Tel: 0896501462

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3. supervising the financial management of research centers and institutes
4. approving the budgets of the Research Institutes and Centers and submitting them to the Minister for Scientific Research for approval
5. approving the organic regulations of the Research Institutes and Centers;
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