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### **Science and development: the action of François Gros at COPED**

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**Abstract:** This article is a tribute to the action of François Gros within the COPED (Committee of Developing Countries) which he created in 1997 and led until 2017. The COPED aims to reflect on the major scientific problems posed to developing countries and to try to provide them with solutions in partnership with them. Its actions have resulted in the organization of mini-forums, workshops, international symposia and reports for governments and authorities. Without being exhaustive, a number of actions carried out by François Gros or on his initiative are described in fields as diverse as health, chemistry, agronomy, energy, applied mathematics, renewable resources management and biodiversity, or education, training and the role of women in the sustainable development of African societies. The diversity of these concerns is a good illustration of the range of areas in which François Gros saw a possible impact of science in the service of development.

**Keywords:** Tribute to François Gros, Sciences and development, COPED

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## 1. Introduction

The Academy of Sciences has always been actively engaged in various scientific exchanges and collaborative programs with developing countries. It is in this context that François Gros, then permanent secretary, created in 1997 the Committee for Developing Countries (COPEP) within the Delegation for International Relations of the Academy of Sciences, with the aim of promoting scientific partnership with developing countries, mainly in Africa. The Developing Countries Committee aims to contribute, through scientific progress, to the resolution of major planetary problems. François Gros chaired it for more than 20 years from its inception until 2017 and continued to participate in its activities until the last months of his life.

## 2. COPEP and its missions as defined by François Gros

From its creation, François Gros defined the missions of COPEP. Its main mission is to constitute within the Academy of Sciences a permanent group of reflection, information and action concerning the major scientific issues in developing countries. For François Gros, COPEP must also encourage concrete scientific partnerships with and for developing countries, promote science education and support scientific research projects in the South.

COPEP's action should make it possible to support and help the emergence of scientific communities in Developing Countries on fundamental questions such as issues related to nutrition, water management or the prevention of infectious diseases and infant mortality, climate change, energies, or even biodiversity, particularly in Africa. Alongside these scientific questions, COPEP is interested in the role of women in the progress of African societies and in the problems of professional training for executives. Finally, COPEP establishes synergy and consolidates relations between national and international organizations dedicated to development, in particular by strengthening links with the directorates of research organizations and the departments devoted to development issues within the European Commission.

The COPEP was designed by François Gros, from the outset, as a scientific committee of the Academy of Sciences in its own right with a very wide spectrum of scientific disciplines involved. He wanted the COPEP not to be limited to a few favorite disciplinary fields. François Gros was aware of the need to involve all scientific fields in a resolutely multi-disciplinary approach. The 2006 "Science and Developing Countries" report [1], of which he was the coordinator, is particularly revealing of this approach. At the time, François Gros was able to convince a large number of members of the Academy belonging to various disciplines to contribute to it.

One of the main means implemented by François Gros to support the scientific communities of developing countries has been to organize mini-forums and international conferences with them. On the occasion of a conference organized in Morocco on Mathematics for Development in 2017, he wrote to the Permanent Secretary of the Hassan II Academy of Sciences and Techniques of Morocco, Professor Omar Fassi-Fehri:

"This support goes through the organization of mini forums and major Franco-African conferences in Africa itself (Senegal, Benin, etc.), which were well attended. Most of these meetings have received significant support, not only from the Delegation for International Relations of the Academy of Sciences, but also from major national research establishments (CNRS, Inserm, IRD, Inra, Cirad, Institut Pasteur, National Museum of Natural History, etc.)"

These mini-forums make it possible to invite some African scientists to present the situation of their problems to the members of COPEP and to the actors of the various French institutions concerned. They are often the prelude to a larger event, of an international nature, organized in an African country, in partnership with local institutions and with the financial support of various sponsors.

### 3. Science and development: the action of François Gros at the COPED

The list of actions and conferences organized by COPED since its creation is impressive. It is available by consulting the COPED brochure on the Academy of Sciences website.<sup>1</sup> Only a few examples will be presented in the following paragraphs. These actions can be grouped around four major scientific axes, consistent with the Sustainable Development Goals (SDGs) since defined by the UN. A first axis concerns the health of populations, well-being and health education, as well as the rights of populations in connection with the Sustainable Development Goals, 2, 3, 4 and 5. A second axis concerns biodiversity, the environment and the management of renewable natural resources in connection with SDGs 12, 13, 14 and 15. A more fundamental axis concerns the scientific disciplines particularly involved in COPED such as Mathematics, IT, physical and chemical sciences, the sciences of the universe applied to development problems in connection with SDGs 6, 7 and 9. Finally, a last axis concerns training and education.

#### 3.1. *Population health, health education and women's rights*

The first axis, relating to the health of populations, well-being and health education and rights, was a major and fundamental axis for François Gros.

In 2001, he organized with Georges Pedro a mini-forum on scientific research related to the development and food security of tropical countries, in partnership with the French Academy of Agriculture. In 2002, a mini-forum was held in partnership with the Institut Pasteur on scientific research and the improvement of health in developing countries, in 2006, a mini-forum on the rise in infant mortality in Africa, another was organized in 2011, in partnership with the GID (Inter-academic Group for Development) on issues related to water, health and agriculture. In 2015, a major international symposium, still in partnership with the Institut Pasteur, was organized on the Ebola epidemic in Africa: "Targeting Ebola. Scientific bases and applications".

In 2019, a tribute session to the recently deceased Professor Ogobara Doumbo is organized by COPED and the Mérieux Foundation at the Simone and Cino Del Duca Foundation. François Gros knew Ogobara Doumbo well, who was an epidemiologist in Mali, well known for his scientific work on the fight against malaria. In 2007, he presented him with the Christophe Mérieux prize under the dome. Malaria is the most serious parasitosis in sub-Saharan Africa with, according to the WHO, more than 90 % of the 400,000 annual deaths recorded worldwide. Professor Ogobara Doumbo had founded with entomologist Yéya Touré the Malaria Research and Training Center (MRTC) in Bamako, a system of excellence with a network of sentinel villages.

François Gros has always been very sensitive to the rights of minorities and populations in developing countries. With Henri Léridon, in 2015, he wrote a report on African demography. It is in this context that it engages COPED in an important International Forum on "Women and Sustainable Development in Africa". This symposium is organized by the network of African Academies of Sciences, NASAC, in 2018 in Dar es Salaam in Tanzania with the support and significant support of the Academy of Sciences and COPED as well as the Bill and Melinda Gates. This Forum is interested in the foreseeable effects resulting from the population growth observed on this continent from the socio-economic and health angles, or in terms of education and access of young people to employment. French-speaking, English-speaking and Portuguese-speaking Africa were represented. At the end of this Forum, a *Declaration of Dar es Salaam* is drawn up by the NASAC with the 170 African participants of the Forum, for the attention of African governments, the African Union and international partners, accessible online [2]. This call to action aims to promote the empowerment of women in Africa, and their participation at all levels of economic, social and political intervention of African nations.

#### 3.2. *Environment, chemistry, agronomy, biodiversity and management of renewable natural resources*

Many events have been organized by the COPED under the leadership of François Gros, concerning these scientific themes. In 2012, a pan-African symposium, bringing together nearly 300 participants, was organized

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<sup>1</sup><https://www.academie-sciences.fr/fr/Codeveloppement/copied.html>.



**Figure 1.** François Gros at the Cotonou symposium on "Chemistry and Natural Resources" in 2015. Photo credit: COPED. All rights reserved.

in Dakar with the National Academy of Sciences and Techniques (ANST) of Senegal. The scientific objective is to make better known the successes of African research and in particular to make a broad inventory during the implementation of the Consolidated Plan of Action for Science and Technology (S&T) with a view to the development of Africa. Sessions focused on health, agriculture, water and environment, energy, applications of mathematics and computer science [3].

In 2015, François Gros organized in Cotonou, with Robert Guillaumont, an important Pan African-Pan European Colloquium on the theme "Chemistry and Natural Resources", with the National Academy of Sciences, Arts and Letters of Benin (ANSALB). Figure 1 shows François Gros during his speech at the Cotonou symposium, which was his last trip to Africa as part of COPED. A special issue of Chemistry Reports "Chemistry and Natural Resources" has been published at the end of this important symposium. Subsequently, in 2019, still alongside Robert Guillaumont, he encouraged the organization of an international symposium on "Chemistry in the face of health and environmental challenges in Africa" which was held in Brazzaville with the National Academy of Science and Technology of Congo (ANSTC). This international symposium made it possible to share and promote as widely as possible the knowledge and conditions of use of controlled and responsible chemistry by addressing methodologies, regulations and the control of drifts. A particular interest was given to teaching and training to allow the sharing of knowledge and practices of chemistry to face health and environmental challenges in Africa. The themes selected concerned the treatment of water and effluents, potability, recycling of waste and hygiene, which constitute major challenges for the African populations concerned.

In 2021 an international symposium, initiated by François Gros, in Burkina Faso on the "Protection of crops against pathogens in sub-Saharan Africa" is organized by Michel Delseny and Christophe Brugidou (IRD) in Ouagadougou. The objective of this symposium was to take stock of current strategies related to the challenges of plant protection in Sub-Saharan Africa and to design/strengthen mechanisms and improvement actions for the efficient and sustainable management of the main bio aggressors. This symposium brought together around 150 participants from African countries and around twenty French people attended by videoconference, due to health and safety conditions. This symposium was part of a series of several mini-forums devoted to questions relating to agronomy, plant biotechnologies, and nutrition and food problems which were held in Paris and Montpellier in 2001, 2008 and 2009, and 2018.

In the field of biodiversity, a mini-forum and a workshop were organized in 2011 and 2012 by Philippe Taquet, to facilitate access for African scientists to the collections and data hosted in various European institutions. The ecology and management of African equatorial forests were the subject of a mini-forum

in 2018, on the sidelines of an international symposium of the international society of tropical ecology, with the prospect of organizing a symposium in Africa internationally on this important topic. Unfortunately, the political situation in the various countries approached has not made it possible to carry out this project to date.

### 3.3. *Energy, mathematics applied to development and computer science*

Energy issues have, from the start, been the subject of particular attention by COPED. Indeed, a first mini-forum was devoted to photovoltaic energy in 1998. It was followed by another, in 2004, organized by Ionel Solomon, on the theme "Energy and climate challenge". Energy is also the subject of a session of the Dakar Symposium in 2012 and was recently the subject of a mini-forum at the Simone and Cino Del Duca Foundation at the end of 2022. Energy management uses mathematical and modeling tools. These tools are also important in the field of health, in particular with epidemiology or in the field of natural resource management.

François Gros was aware of the particular character and the importance of Mathematics, particularly applications in the Life Sciences. Mathematics is a separate discipline in developing countries with a large and very active community, particularly in Africa, because it does not require expensive experimental devices. The 2006 report, which is still relevant, already includes an important chapter on mathematics and information and communication technologies. On the occasion of the organization of the Mathematics Applied to Development (MADEV) conference organized at the headquarters of the Hassan II Academy of Sciences and Techniques in Rabat in 2017, François Gros writes:

"I would like to pay a special tribute here to Jean-Pierre Kahane who has made a very strong contribution within COPED for many years to leading and developing this fundamental theme by contributing to the success of an important forum: 'Franco-Maghreb convergences in mathematics' in 2007 and of a second forum 'Franco-Vietnamese convergences in mathematics, computer science and mechanics' in 2010."

The first MADEV conference focused on the applications of mathematics in epidemiology, management of fisheries resources, plant biodiversity, health, economy and energy. It brought together more than 350 participants from all over Africa. Many doctoral students and young African researchers have been supported by COPED. A second MADEV conference was organized by the National Academy of Sciences and Techniques of Senegal (ANSTS) and COPED in Dakar in 2019, on the theme "Tools and methods of control theory applied to energy, epidemiology and water" with the assistance of Jean-Michel Coron and Olivier Pironneau.

### 3.4. *Education and training.*

Alongside strictly scientific actions, François Gros has constantly worked to promote the training of scientists and executives from African countries, particularly young people. This also resulted in the organization of several mini-forums or workshops. Let us cite a few: science teaching in 2003, university education and developing countries, in 2004, research practices and professions in 2009, Witness to this concern for education, the 2012 colloquium, in Dakar was entitled "Educational technologies in relation to the development of Africa". In each of the international colloquia that have been organized in Africa, he has always ensured that a training component for technical and senior executives is included in the programs and final recommendations. The Academy of Sciences has financed the travel and accommodation expenses of young doctoral students and young researchers to participate in international conferences and has mobilized funding from the AUF for this purpose. From the beginning, François Gros imposed the rule of free participation in these conferences, it being up to the organizers to raise the necessary funds.

A workshop to support the writing of scientific articles for African researchers and students was organized in 2011 by Guy Baudin de Thé, with the support of COPED and IAP. In the same vein, François Gros organized a workshop with NASAC in 2012 to improve the communication strategies of African science academies, which was attended by administrative staff from NASAC academies and staff from the Academy of Sciences. He also took an active part in the organization of AEMASE (African European Mediterranean Academies for Science Education). Odile Macchi represented the COPED and the Academy of Sciences there by participating in the

first two conferences in Rome in 2014 and Dakar in 2015. She organized the third AEMASE conference at the Academy of Sciences in 2017.

François Gros insisted that each colloquium be placed under the patronage or sponsorship of the high political and scientific authorities of the organizing countries. Emphasis was placed on the participation of young African researchers. The contribution of the colloquia should make it possible to learn about scientific advances and the work carried out in African and French laboratories but above all to allow discussions from which spontaneous collaborations can arise. Each colloquium gave rise to a collection of summaries, a report and/or recommendations, the documents being approved on site with the partners involved. François Gros has always participated with great interest in the conferences and expressions of friendship of our hosts. He met the presidents of the African Academies who were often his friends as well as the many personalities he knew in the scientific community. He liked to discuss with young researchers. He was always very persuasive and he got many of us involved in COPED actions. An International Follow-up Committee is also set up after each colloquium, made up of members of COPED, the organizing African Academies or institutions and a representative of each participating country. This Committee issues recommendations for decision-makers. François Gros was particularly keen that recommendations result from these meetings and be transmitted to the supervisory authorities.

#### **4. The COPED in the continuity of the action of François Gros**

François Gros became Honorary President of COPED in 2017. He nevertheless continued to be very active in it by attending all our meetings. He intervened with great courtesy and a spirit of synthesis quite remarkable. He thus continued to make a strong contribution to the strategic choices and orientations of COPED. He has always been able to attract newly elected members of the Academy to participate in the work of COPED by encouraging them to undertake new actions in their respective fields. The COPED must continue its dissemination action among the members of our Academy, especially those newly recruited.

In 2007, the Inter-Academic Grouping for Development (GID) was created by André Capron with the assistance of François Gros. The GID is an international association bringing together several academies from Southern Europe, the Mediterranean and Africa. The GID aims to “mobilize knowledge in the service of genuine Euro-African co-development”. COPED has developed its action for science in the service of development in Africa and mainly in Sub-Saharan Africa. François Gros, however, has always wanted to maintain close ties between COPED and the GID. André Capron regularly attended COPED meetings, as did Catherine Bréchnignac who later attended to represent the GID.

François Gros had organized several seminars for reflection and foresight on science in the service of development at the Academy in order to bring out the major scientific issues for development and to determine the action of COPED for the years to come. In particular, it enabled the strengthening of relations between the Academy of Sciences and the scientific community of developing countries, particularly the Academies of Sciences of these countries. The action of COPED during these twenty-five years of existence has had a profound impact on the African scientific community by offering it a place of meeting and reflection, by promoting its contact with French researchers. Many young African researchers have taken their first steps at the international level by participating in conferences organized in partnership between COPED and the institutions of their country. COPED has thus contributed to the development and emergence of scientific research in Africa in the service of sustainable development by establishing relationships of equality and trust with African researchers. This heritage of François Gros, the COPED must make it bear fruit and continue his work. The task will be difficult, as the immensity of his culture, his scientific and human aura were great and as he had no equal in mobilizing financial support. It is also complicated by the increasingly unstable political situation in many countries, compromising the organization of international scientific meetings in Africa. The Academy of Sciences and its Delegation for International Relations, however, will be keen to continue this work, both scientific and humanitarian.

## 5. Disclosure of interests

The authors do not work, do not advise, do not own shares, do not receive funds from an organization that could benefit from this article, and have not declared any affiliation other than their research organizations.

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