

“The Status of Chemistry on the African Continent”

Introductory Remarks

by Dr C. F. Garbers

Chemistry in Sub-Saharan Africa is linked strongly to Higher Education. Over the past decades many efforts in Africa were directed at the upgrading of science generally and it is difficult to accumulate information on chemistry more specifically. The report: “Chemistry in Africa’s least Developed Countries. An Overview of Capacity Building and Research Support” outlines information gathered from many sources over the past year. I am fully aware of the overview’s shortcomings, and will welcome any criticisms, suggestions and input towards its improvement. For the purpose of this discussion it is assumed that you have read the overview, as well as the recommendations to IUPAC/UNESCO. In order to stimulate discussion I wish to use this opportunity to highlight specific issues and express my personal opinion on the way forward.

Some statistics regarding Chemistry in Sub-Saharan Africa are summarized in Figure 1. As a criterion – with all its inherent weaknesses – the number of Abstracts of papers by country in Chemical Abstracts was used. Such a comparison is based on the assumption that the address of the first author corresponds to the place of work. Other output criteria could have been used, but was dependent on responses from the individual chemistry departments from all African universities. The analysis underlines the great variation between countries, with no Abstracts emerging in 1996 from five countries, and a further 21 countries with less than ten Abstracts per annum. Many countries have sizable activities on which to build, with Nigeria and South Africa dominating the scene. An effort to use these Abstracts to identify areas of activity in the Least Developed Countries, proved fruitless. It should also be noted that in the 1997 UNESCO Statistical Yearbook, 24 of the 45 listed Sub-Saharan countries had less than 10 000 third level(Post Matric) students. Problems are further exacerbated by skewed distribution of enrolments across subjects, with high enrolments in the Arts and Humanities and low enrolments where the greatest need is: scientists, engineers, high-level managers, accountants and auditors to fill the operating positions and to serve as teachers, researchers and consultants(World Bank, 1994).

Another issue to dwell with briefly is Aid Dependency. This is graphically presented in Figure 2, displaying Aid as a percentage of Gross National Product. Facets of Higher Education, generally, and Chemistry, more specifically, are highly dependent on sustained support by the donor community. Relationships between institutions and specific donor countries were established over extended periods. One of the truly successful outcomes, is the corps of African professionals trained in the best institutions the world has to offer e.g. the Alexander von Humboldt Foundation provided me with an address list of its 127 fellows from Africa, two of whom are present today! This provides a sound and impressive base on which to build. The problems lie elsewhere!

ICSU and its constituent Unions, and more particularly IUPAC, are already involved in many activities of great significance to Africa. IUPAC, in line with its objectives, provides an umbrella home to chemists throughout the world. If IUPAC wishes to embark on further initiatives, a detailed study of ongoing activities needs to be made of an arena served by many external assistance agencies, which strive increasingly for more coordination of efforts in order to enhance efficiency.

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Figure 3: “Sub-Saharan Africa: Development Aid”, reflects some of these external assistance agencies. Only 11 of the 21 donor countries involved in Africa are shown, together with some of the funding institutions created by the respective countries. Reference is made to the large number of active NGOs; the academic, funding and organizational institutions, and the active foundations. Apart from the United Nations and its various agencies, the following activities need to be emphasized:

- The World Bank
 - Firstly, the impact of the joint initiative of the Bank with the African governments for the revitalization of the universities and the envisaged approach on any new IUPAC initiative needs to be carefully considered, and
 - secondly, the future impact of the launch of the African Virtual University pilot phase. Linked into this is the digital library programme to make scientific information available to African students.

In conjunction, progress with the Francophone Virtual University has to be explored, particularly since Chemistry will be one of the courses on offer.

- ADEA(Association for the Development of Education in Africa)
The Association was started in an effort to enhance aid effectivity, with the acknowledgement that the primary responsibility for development rests with the developing countries themselves. Amongst the currently eleven operating Working Groups, the following have specific significance:
 - Distance Education/Open Learning;
 - Books & Learning Materials;
 - Higher Education; and
 - Multi-country Collaboration.

As detailed in the Report, the respective agencies of the donor countries have accumulated decades of experience in close consultation with recipient African countries. Over the years their approaches were modified and adapted. Much was achieved.

Figure 4 shows a break down of Japan’s Official Development Assistanc(ODA), totaling USD 18,237 billion for 1995. This sum includes the ODA for bilateral grants, bilateral loans, and contributions to multilateral institutions(Total USD 14,489 billion), as well as other official flows. Of this, approximately USD 1,616 billion went to educational services and investments. Over the period 1993-1995 two specific chemistry projects were supported for a total of USD 9,273 million in Zimbabwe and Ghana. An analysis of all the projects supported showed(Decreasing order) aid towards(Figure 5):

- (i) A large number of grassroots projects;
- (ii) Projects towards increased food production;
- (iii) Establishment of infrastructure(e.g. water availability, sewage systems, electricity, roads, bridges);
- (iv) Food aid;
- (v) Variety of further projects.

For various reasons, mobilizing support for Higher Education is difficult.

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Concluding remarks(Figure 6)

In my study I experienced that people in considering issues surrounding Africa, have a tendency to generalize. Huge differences between countries and between institutions prevail. As a general statement it could be said that a large number of built-in interrelated uncertainties and deficiencies exist in Higher Education. Higher Education is still very elitist and selective in the admission of students. Rising demand for access prompts a rethink of the whole process. The outcome of initiatives, however laudable, could be dependent on political decisions by African governments on a continent of changing political fortunes and under-performing economies

Neither IUPAC nor UNESCO is a major funding organization, but together they have the ability to make direction-giving inputs. Should IUPAC/UNESCO decide to become involved in selection/funding/launch of a new initiative in Chemistry, a possible approach – with the possibility for reviewing the involvement - is outlined in the recommendations by the Task Group to IUPAC. A critical requirement would be the elaboration of a new approach with all stakeholders. If a new approach is not introduced, it will in all probability be regarded as ‘more of the same’.

It would appear that Higher Education on the African continent is undergoing a paradigm shift :

- from teaching to learning,
- from contact to distance/open modes,
- from books to electronic and virtual approaches,

which further more creates increased possibilities for inter-institutional collaboration.

In my opinion the Committee on the teaching of Chemistry has something new and important to contribute. Furthermore, IUPAC is active in the fields of e.g Analytical Chemistry, Environmental Sciences, and in Chemistry in Human Health with considerable expertise in publication. Hence for consideration the following could be considered:

- Link into the new approach to learning through the preparation of texts for training and as reference in selected analytical fields of importance to developing countries, e.g. water quality, human health, food analysis, chemical information access, etc. This can be done in collaboration with a higher education institution and could lead to some qualification;
- Extend the work of CHEMRAWN to techno-economic analysis of countries (and regions) to identify industry and market possibilities particularly in the chemical field.

I wish I could be more constructive! Thank you.