The Kenya-Belgium Cooperation in Marine Sciences: a review of ten years scientific collaboration

Report on the occasion of the tenth anniversary of the Kenya-Belgium Project in Marine Sciences

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1. Introduction

Marine scientific research should not be looked upon as a luxury we can do without, but as a major tool in upgrading the welfare of mankind. More than 60% of the world's population lives within 50 kms of one of world's oceans and seas. Many people are highly dependent on the marine environment in terms of income generation, food, health, leisure activities, etc. In the mean time the global population is growing fast leading to increasing demands of natural resources worldwide. With the marine environment covering 2/3 of the earth's surface, it is clear more and more resources will have to come out of the oceans.
On the other hand the seas contribute substantially to the biodiversity on earth making them key-sites for conservation of our global inheritance. The realization that they are a treasury of economical potential can only increase their estimated value.

Marine researchers study the ecosystem in all its aspects, in order to provide policy-makers with the necessary background information for appropriate management options. They can open doors for the sustainable exploitation of marine resources and guarantee the wide dissemination of information on the richness of the seas.
It is not an exaggeration to say that marine sciences are an essential chain in the development of a better world.

The Belgian Government was one of the first governments to understand that only cooperation between developed countries (in terms of Bruto National Product and history of marine sciences) and countries with limited financial but huge natural resources can address this issue. They asked Prof.P.Polk, one of Belgian's prominent marine scientists, to travel to Kenya to investigate the possibilities of scientific cooperation between the two countries. It was this mission that resulted in the start of the "Kenya-Belgium Cooperation in Marine Sciences" in 1985. Now ten years later we would like to look back in time and see how successful this symbiosis has been.

2. The Kenya-Belgium Project as an engine for marine research in the Eastern African region

The Kenya-Belgium Cooperation in Marine Sciences was launched in 1985 with a first phase (1985-89) on "Cooperation in the field of Marine Ecology and Management of the Coastal Zone". This project, sponsored by the Belgian Administration for Development Cooperation (BADC = ABOS), aimed at setting up a general framework for collaboration between different scientific institutes and marine scientists in Belgium and Kenya, with the Free University of Brussels (VUB) and the Kenya Marine and Fisheries Research Institute (KMFRI) as key-institutions. A smaller project on the "Culture of Artemia" between the Artemia Reference Centre at the State University of Gent and K.M.F.R.I. was run simultaneously from 1985 to 1987.

The main principle for a succesful cooperation is the linkage between equipment, education and research. Indeed the best results obtained by researchers from developing countries at the best universities abroad are useless, if once back in their country, there is no possibility to continue with the research started and/or to set up their own research. The same goes for the complex and expensive equipment which is worthless if appropriate laboratory space is lacking, or if no trained staff are present to operate and maintain the equipment. Although these remarks are obvious, those problems occur too often ! The consequences are frustrated scientists who can't make use of their knowledge and the deterioration of expensive equipment because it's not being used or maintained.

Since linking research and input of equipment with training was felt as a necessary precondition for the success of the cooperation, a Postgraduate Course on Fundamental and Applied Marine Ecology (F.A.M.E.) has been organized since 1985. This course takes place in Brussels at the VUB making use of the best knowledge available amongst the different universities of Belgium and some institutes in the Netherlands. It is financially supported by A.B.O.S. and leads to the degree of "Master of Science" in Fundamental and Applied Marine Ecology. The course is oriented to scientists from developing countries. Many East-African students got their degree during all these years.

The initial phase of the Kenya-Belgium Project in Marine Sciences was extended by the Flemish Interuniversity Council (VLIR) for another four years (1989-1993) in a new project called "Higher Institute in Marine Sciences". During this period the base for a successful cooperation in marine research was further developed resulting in more institutes all over East-Africa and Europe being actively involved. Several sister- and daughter projects were started or continued with financial support of the Belgian Government or the International/European Community.

The need: 1) to provide marine scientists with relevant and up-to-date scientific publications, 2) to improve communication between marine scientists within the East-African region and between this region and outside, was strongly felt during the first phase of KBP and therefore initiated within this project by Mr.P.Pissierssens, a student of Prof.P.Polk at the VUB. These efforts brought the Intergovernmental Oceanographic Commission (IOC) of UNESCO to launch the RECOSCIX-WIO project (Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean Region) in February 1989. This program currently coordinated by the Limburg University (LUC) has an important role to play in the region and will be continued in the future.

For the period 1988-92 the Belgian universities of Gent (RUG), Brussel (VUB) and Limburg (LUC) were given extra funds by F.K.F.O. (Fonds voor Kollectief Fundamenteel Onderzoek) in order to support their scientific cooperation on biodiversity with Kenya. Also here, the coordinating role of the Kenya-Belgium Project in Marine Sciences proved to be a major attraction for many other initiatives. Another F.K.F.O. project with the RUG and VUB will take off in January 1996.

In the mean time the cooperation framework was extended beyond the borders of Belgium and Kenya by involving other European countries in the research programs. Two successive EEC-funded projects focussed on the dynamics of mangrove ecosystems ("Dynamics and Assessment of Kenyan Mangrove Ecosystems" - 1990/1992 - EEC/STD2) and the link between mangroves, seagrass beds and coral reefs ("Interlinkages between Eastern-african coastal Ecosystems" - 1993/1995 - EEC/STD3). Within these projects besides Belgium and Kenya, different institutions in the Netherlands, Italy, Mozambique, Tanzania and Portugal were collaborating intensively.

As a logical extension, a third phase of KBP started in 1993 with a VLIR-sponsored project on "Research towards sustainable exploitation of natural resources in mangrove forests", aimed at bringing the most promising fundamental research results obtained before 1993 into practice. This project now focusses on the wise use of natural marine resources so that they can be exploited in a sustainable way by local communities. Whereas mangrove oysters and mangrove trees are the main topics studied in this project, other studies dealing with sustainable management and monitoring of shallow coastal waters (seaweed farming, carrying capacity lobster fisheries, oil pollution monitoring, birds as bio-indicators of coastal areas, phytoplankton culturing) were carried out as well. The construction of two oysterfarms and the reafforestation of more than 10 ha mangrove forest during the last few years are considered as some of the crowning glories of the cooperation.

The success story of the KBP convinced the V.L.I.R. to initiate a comparable initiative at K.M.F.R.I.-Kisumu where Prof.Symoens wanted to develop a Kenya-Belgium Joint Project in Freshwater Ecology. The project was launched in 1993 for a period of 4 years and has already proved to be a very laudable initiative.

3. Realizations

The input of the Belgian Government (through BADC and VLIR) for the three phases of the Kenya-Belgium Project (sensu strictu) amounted to almost 1.9 million US$. Together with the small Artemia-project (0.3 million US$), the FAME-course (0.3 million US$ = funds spent for Kenyan students only), the FKFO-contribution (0.2 million US$) and the RECOSCIX-program (0.6 million US$) a total amount of more than 3 million US$ was set free. With the two EEC-programs - in which Belgium and Kenya were major players - added to this amount (1.3 million US$) one comes to a sum of 4.5 million US$ directly or indirectly benefitting the marine sciences in East-Africa (Tab.1).

Table 1: Approximation of the financial input in the Kenya-Belgium Cooperation in Marine Sciences between 1985 and 1995.
A distinction is made between KBP "sensu strictu" and the wider cooperation including the many other projects that came up through the stimulating actions of KBP.

Project	Sponsors	Period	Input (*1000) BFR	US$
KBP 1	Govt.BE (BADC)	1985-88	20,000	665
KBP 2	Govt.BE (VLIR)	1989-92	20,000	665
KBP 3	Govt.BE (VLIR)	1993-96	17,000	565
Artemia	Govt.BE (BADC)	1985-87	8,000	265
FAME *	Govt.BE (BADC)	1985-95	10,000	335
RECOSCIX 1	UNESCO-IOC	1989-91	3,000	100
RECOSCIX 2	Govt.BE (VLIR)	1991-95	14,000	465
FKFO 1	Govt.BE (FKFO)	1988-92	5,000	165
EEC-STD2 **	European Community	1990-92	18,000	600
EEC-STD3 **	European Community	1992-94	21,000	700
Total input		1985-96	136,000	4,525

(: for the calculation of the financial input only Kenyan students were considered; **: contributions to all the participating countries are included)*

Realizations of the Kenya-Belgium Cooperation in Marine Sciences can also be assessed in terms of:

3.1. Equipment/materials

When the first project took off in 1985 the equipment of K.M.F.R.I. needed to be updated and upgraded. Particularly during the first phases of the cooperation a lot of money was spent in purchasing appropriate equipment for the laboratories, buying cars and boats, computers, etc. The need to have good transport means for sampling purposes resulted in the purchase of several cars. The total input in materials brought to KMFRI headquarters through the different projects amounts to roughly 30 million BFR (1 million US$).
Nowadays, K.M.F.R.I. has the best equipped laboratories in the region including expensive devices such as gas chromatographs, auto analyzer, atomic absorption spectrophotometer, electronic balances, high-quality microscopes etc. The so-called "Belgian store" contains a wide selection of chemicals to be used for scientific research. The presence of the RECOSCIX project and the Regional Dispatch Centre at Mombasa has provided K.M.F.R.I. with the most advanced computer based telecommunication systems.

3.2. Training

Between 1985 and 1995 15 Kenyan researchers from K.M.F.R.I. obtained a degree "Master of Sciences" at Belgian universities. Thirteen of them completed the Postgraduate Training Course on Fundamental and Applied Marine Ecology (FAME) at the VUB, one followed the Postgraduate Advanced Studies in Nematology (RUG), one the Master of Science in Aquaculture (RUG) (Table 2).
In 1983 Dr.E.Okemwa obtained his MSc at the VUB where he attended the precursor of the FAME-program, at that time organized by the Institute for Marine Scientific Research (IZWO).

Table 2: Degrees of "Master in Sciences" obtained by research officers from K.M.F.R.I. through the Kenya-Belgium Cooperation in Marine Sciences.

Period	Course	Name	Scholarship
1985-87	FAME	Mr.M.Odido	ABOS
1985-87	FAME	Mr.D.Oteko	ABOS
1987-89	FAME	Mr.B.Onyango	ABOS
1987-89	FAME	Mr.J.Rasowo	ABOS
1989-91	FAME	Mr.P.Oduor	ABOS
1989-91	FAME	Mr.J.Maithya	ABOS
1990-92	FAME	Mr.H.Ong'anda	ABOS
1990-92	FAME	Mrs.A.Arrumm	ABOS
1993	Aquaculture	Mr.J.Radull	ABOS
1992-94	FAME	Mr.S.Mwangi	ABOS
1992-94	FAME	Mr.M.Osore	UNESCO
1993-95	FAME	Mr.P.Wawiye	ABOS
1993-95	FAME	Mr.J.Okondo	ABOS
1993-95	Nematology	Mrs.A.Muthumbi	ABOS
1994-96	FAME	Mr.H.Lungayia	ABOS

More than 40 short-term fellowships were given to other K.M.F.R.I. researchers to attend workshops abroad or follow additional training or prepare for a PhD. Two persons from K.M.F.R.I. (Dr.E.Okemwa, Dr.H.Oyieke) obtained a PhD degree through the Kenya-Belgium Cooperation. Only Dr.E.Okemwa, who was fully supported by KBP was promoted at a Belgian University (VUB). Another seven research officers from K.M.F.R.I. Headquarters (Mombasa) are currently working on PhD-programs.

3.3. Research output

If we look more in detail to the number and type of publications by K.M.F.R.I. research officers over the period 1975-1994 (Table 3) we find that the total number of publications has increased substantially since the beginning of the eighties. From 1985 onwards the number of publications on marine issues has increased considerably. However the most striking conclusion is that since the start of the Kenya-Belgium Cooperation in Marine Sciences in 1985 the number of international publications has increased drastically. Can we conclude that Kenyan researchers found their way to international journals because of this international exchange of ideas and training ?

Table 3: Scientific publications by K.M.F.R.I. researchers between 1975 and 1994 (cf. Ruwa, 1995 + addenda).

Period	1975-79	1980-84	1985-89	1990-94
Total	4	42	68	68
Theses	0	9	8	9
Local journals/ local symposia	3	24	30	22
International journals	1	4	27	34
Proceedings intern.symp.	0	5	3	3

Through the input by the Belgian Government (in terms of financial support and expertise cf. VVOB-experts active at several Kenyan universities) many Kenyan university students came to benefit from the Kenya-Belgium Cooperation in Marine Sciences and do research on marine topics. Some of them obtained a MSc-degree at a local university.

On the Belgian side many students visited Kenya to do fieldwork in the framework of a MSc-thesis in cooperation with a Kenyan counterpart. Between 1985 and 1995 a total of 31 students from 4 Belgian universities (11 VUB, 16 RUG, 3 KUL, 1 ULB) succeeded in this purpose. At least seven Belgian researchers collected data in Kenya in order to obtain a PhD-degree.

During the ten years of cooperation studies carried out by teams of Kenyan and Belgian researchers have been numerous and diversified. They include many aspects on zoo- and phytoplankton,
phyto-, macro- and meiobenthos (with specializations on Turbellaria, Nematodes, Harpacticida), epibenthos, prawns, fisheries, oysterculture, macrophytes, coral reefs, physical oceanography, marine chemistry, pollution, birds, ecophysiology, etc. Many new species have been recorded at the Kenya coast since the start of the cooperation. In some taxa intensive studies of the Kenyan marine fauna revealed a real new world of organisms !

Research results can not only be measured in terms of participation in symposia, publications or new species. Some results were so promising that a lot of energy was put in trying to apply them for the benefit of the community. Two examples can illustrate that clearly:

* oysterculture:

Since the start of the project oysters have been an important item of study. The driving force, Prof.P.Polk - who made a PhD on oysters in 1962 - set up many experiments at Gazi Bay together with Dr.E.Okemwa, Mr.R.Ruwa and many others. Together they laid the foundations for the construction of the largest oyster farm in Africa build at Gazi in 1993. This farm, set up by Mr.J.Tack, consists of 170 racks holding more than 30,000 roofing tiles and containing 500-600,000 oysters. Now two years later a number of oysters have already reached the commercial size and a marketing & distribution network is currently prepared. In 1995, the experience from Gazi was used to extend oyster culture to a new place, but now with the full involvement of a local women group. The Shaza Women group managed to set up another farm at Shirazi, under supervision of Mr.J.Seys, the manager of the KBP project and Mr.A.Wasi, sociologist at the Coast Development Authority. Funds were made available by Mr.P.Verleysen, the Head of the Belgian Administration for Development Cooperation at the Belgian Embassy in Nairobi.
Four months after the completion of this second oyster farm (60 racks, 11,000 tiles) the settlement of young oysters and the first growth here are very promising.

* mangrove reafforestation:

Studies on mangrove areas and the interlinkages between the different biota and abiota were studied thoroughly during the EEC-STD2 project (1989-92). Based on this data the need was felt to use this knowledge to work out strategies for reafforestation of this much threatened habitat. Students of the VUB and the University of Nairobi went into this subject assisted by Dr.D.Van Speybroek, a mangrove expert, at that time based at the University of Nairobi as VVOB-expert. One of the students, Mr.J.Kairo, became the key-person in the reafforestation program of the Kenya-Belgium Project. In 1994 he managed to plant more than 10 ha of mangrove (90,000 trees of five species) on clear-cut areas in Gazi, sponsored by KBP and USAID. In five of the reafforestation plots an ecological monitoring program (called "MAREMO") was set up in order to follow up the recolonization process after replanting. All this information will be very useful for a much-needed management plan on Kenyan mangroves.

The involvement of local communities in the application of research results has also forced the marine scientists to reorient themselves towards a more multidisciplinary approach. Cooperation between sociologists, economists and marine scientists has become more and more vital to the success of projects such as KBP. The close cooperation with Coast Development Authority and the Centre for Sociology (VUB) since 1994 has been essential towards the achievement of results in the oyster culturing. Economic studies concerning oysters and mangrove rehabilitation have proved to be as indispensable.

And last but not least let's not forget that scientific projects have a lot of non-scientific outputs as well. Many researchers from Europe developed a deep friendship with Kenya and its people. Some even found wives here !
The contacts made in the village of Gazi were translated into the wish to assist individuals or the community as a whole. The recent ongoing restoration of the Gazi primary school is a good example. With funds collected from people who developed an attachment for the village during their short or longer stays it has been possible to assist the community in a proper way.
The development of a new oyster farm in Shirazi has brought the needs of the Shirazi people to the attention of the Coast Development Authority, organizing the construction of a primary school there ! These results, although they can't be translated in scientific publications or nice-looking tables, are worth mentioning and may not be neglected.....

3.4. International cooperations and recent status

Since 1985 K.M.F.R.I. has worked together with many Belgian universities and institutions. In fact many of the Belgian institutions dealing with aspects of marine research (VUB, RUG, KUL, LUC, Un.Liège, IZWO) have been involved in cooperating projects with Kenya, which, it must be mentioned, in turn has led to a better collaboration between the Belgian universities as well !
The input of the LUC and UIA is directed mainly through the RECOSCIX-WIO project. Generally spoken, one can say that the Belgian universities offered excellent training conditions for many Kenyans through short-term training courses/workshops or post-graduate courses and are engaged in sharing their expertise with them. Many Belgian researchers and students took the opportunity to travel to Kenya to do research in cooperation with Kenyan counterparts in the very rich and exciting tropical marine ecosystems.

Mainly through the two EEC-funded projects cooperation between other European countries and the East-African region has emerged. The first project EEC-STD2 (1989-92) linked Kenya (KMFRI, University of Nairobi, Kenyatta University), the Netherlands (Delta Institute for Hydrological Research - Yerseke, Katholic University of Nijmegen), Belgium (VUB and RUG) and Italy (University of Firenze).
The EEC-STD3 (1993-1995) is a cooperation between Belgium (VUB), Kenya (KMFRI), the Netherlands (Delta Institute, now called Netherlands Institute for Ecological Research; Katholic University of Nijmegen), Tanzania (Institute Marine Sciences - Zanzibar), Mozambique (University of Educado Mondiane) and Portugal (Lisbon University).

In 1992 the TYRO-expedition under the Netherlands Indian Ocean Programme was set up by the Netherlands Foundation for Marine Research (NSOZ) to study the major bio-oceanographic changes during the two monsoon seasons within the Indian Ocean. Several countries bordering the Indian Ocean were involved with many Kenyan researchers collaborating closely.

Thanks to the ten-year history of extra support by the Belgian Government, K.M.F.R.I. has been able to develop towards an "Excellency Centre for Marine Science" within the East-African Region. It fulfills important roles within the Western Indian Ocean Marine Science Association (WIOMSA) and the IOC Regional Committee for the co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO). It is hosting several international or regional workshops and seminars every year. The increasing role KMFRI is playing in African and international marine sciences is also concretisised in the recent organization of two important symposia. From 29th March to 2nd April 1993 KMFRI organized the "International Symposium on the Status and Future of Large Marine Ecosystems of the Indian Ocean" in Mombasa; in 1995 (31 July to 4 August) Nairobi was chosen as key-site for the "First African Fisheries Congress" which was successfully concluded under Dr.E.Okemwa's chairmanship. The election of Dr.Okemwa as vice-chairman of the IOC Executive Committee in 1995 can only emphasize the growing international recognition of KMFRI and Kenya.
The cooperation has also benefitted several Belgian researchers in terms of job promotion and (international) recognition. Some of the "anciens" within KBP are now promoted to responsible functions within IOC, UNEP, NMK or KWS.

Moreover, through the Belgian and IOC-input within the RECOSCIX-WIO project, the Regional Dispatch Centre at KMFRI has become an important information exchange node for the region. As a result, in October 1994 KMFRI was recognized as a new input centre for ASFA (Aquatic Science and Fisheries Abstracts), a system with international reputation.

4. Future

We strongly feel that the position of KMFRI and the other key-institutes in marine research in the East-African Region must be maintained and enhanced. Only with continuing support in the future will they be able to fulfil their very important role in the field of tropical marine sciences and in the management of the coastal zone in general.

Cars, boats, laboratory equipment, etc. have to be maintained to optimalise the ongoing research activities. Other equipment is bound to regular upgrading (computers, literature,....) if one doesn't want to be thrown back and loose track with cooperating institutes abroad. Also, an institute with the reputation of KMFRI is supposed to be equipped with a conference room, a guest wing for visitors and more of these facilities. All this requires a financial input in order to ensure a continuing output.
Even after ten years close cooperation with Belgium one can not ignore this by assuming that research can now be done without any input in terms of maintenance and capacity building !

Due to a rule that postgraduate courses can exist for not more than 12 years the FAME-course is coming to an end with the last cycle from 1995 to 1997. However a child of FAME is about to come with the submission of the ISMAE-course (Course on International Sustainable Management of Aquatic Ecology) to the Belgian Government. This course combines Marine and Freshwater Ecology with as key-players in Belgium the VUB and UIA (Universitaire Instelling Antwerpen). The ISMAE course is an essential tool in providing adequate training to future generations of East-African aquatic scientists aiming at being a practical course focussing on techniques of research within the region.