4.

Capacity development in plant sciences in Ethiopia

1. GENERAL INFORMATION

1.I Title of practice or experience

Capacity development in plant sciences in Ethiopia

1.2 Category of practice/experience and brief description

The practice is one of capacity-building for properly informed use of the plant natural resources of Ethiopia. This information is vital for any proper protection and sustainable use of these plant resources. It also includes capacity-building in human resources for the scientific and technical support skills needed to research, compile and analyse the basic information, and to care for the specimens and the data associated with them.

The Ethiopian Flora Project in the Biology Department of Addis Ababa University started in 1980 and is still going on, all with the support of the Swedish Government. The main aim of the Project is to publish a modern Flora for the country. The secondary aims are to develop the human resources to carry out research and write and update the Flora locally, and to develop the institutional capacity for making and caring for the plant collections and undertaking research into the flora of Ethiopia and its neighbouring countries.

When the Project started, there were only two Ethiopian botanists with higher degrees. One of them, a plant ecologist, became the leader of the Project. Now the Department of Biology has the largest number of plant taxonomists in Sub-Saharan Africa north of the Republic of South Africa and the botany section is the strongest in the Department of Biology.

The National Herbarium, in which the Project is housed, had a collection of only about 14,000plant specimens in 1980; now it has over 70,000.

The plants of an area are referred to as its flora (small 'f'), and the book (usually of several volumes) which gives the technical distinctions among the plant species and describes each one of them sufficiently for definite identifi-

cation is called a Flora (capital 'F').

The National Herbarium, which is publishing the Flora of Ethiopia, is the only institution of its kind in Sub-Saharan Africa, except South Africa, and one of the very few throughout the Third World which is publishing its Flora locally. The Project became one of the earliest users of desktop publishing in order to produce the volumes locally.

All this is the result of a systematic effort to develop capacity from the Ethiopian side, and long-term and predictable financial support from the Swedish Government. Many universities, herbaria and other research institutions in Africa, Europe and North America have been involved in contributing knowledge and skills in making all this possible.

1.3 Name of person or institution responsible for the practice or experience

The National Herbarium

*1.4 Name and position of key or relevant **persons** or officials involved'*

Leaders and Associate leaders of the Ethiopian Flora Project, started in **1980:**

Dr Tewolde Berhan Gebre Egziabher, **1980-1995**
Prof. Olov Hedberg (Uppsala University), **1980-1990**
Dr Inga Hedberg (Uppsala University), **1990** to present
Dr Mesfin Tadesse, **1985-1992**
Prof. Sebsebe Demissew, **1995** to present
Dr Ensermu Kelbessa, **1996** to present

Keepers and Curators:
Dr Mesfin Tadesse, **1980-1992**
Prof. Sebsebe Demissew, **1995** to present
Dr Ensermu Kelbessa, **1994** to present

Editorial Board Members:
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[1] **Unless otherwise stated, all personnel have been employees of Addis Ababa University.**

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1.6 Name of person and/or institution conducting the research

The National Herbarium

1,7 Details of research person/institution

As in 1.5 above

2. THE PROBLEM OR SITUATION BEING ADDRESSED BY THE PRACTICE/INNOVATIVE EXPERIENCE

What is the importance of building capacity in plant sciences?

In order to communicate the work done on any living thing, the latter has to have a name. We name the members of our families as well as the plants and animals familiar to us in our surroundings. **We** also name anything that is important to us – harmful or beneficial – no matter where it comes from. The name is the reference point for all other information about the person, plant, animal or inanimate object. It is the identifier in any communication. Local people name the things around them and communicate information on these things to one another in the community. This is what we now call folk taxonomy and indigenous knowledge.

But we also live in a world community, which has developed internationally recognised methods of communicating information about ourselves and the world around **us.** The most universally recognised and uniform of these

communication systems is science. Science is a global language that has evolved since people first started to systematically investigate their surroundings and organise the resulting information. Modern/European science grew out of the cultures that developed around the Mediterranean Sea, the cultures of the Arabs, Greeks and Romans. Over time, each of the disciplines in science has developed its own rules for naming and communicating the articles it works with. In the natural sciences, these are all living things, plants, animals and microorganisms, and the borderline viruses. Thus, any scientific study of living things has to use these internationally recognised rules to name and communicate the results of its findings. Conversely, knowing the name of an organism enables a scientist, and anyone else interested, to trace the information already accumulated about that organism. The science which names living things is called taxonomy or systematics.

Lack of an ability to give scientific names to the plant and animal resources of a Third World country is a major obstacle to any other basic or applied research and development for those resources. This was the challenge that a group of scientists faced in Ethiopia in the 1970s. How they faced and are overcoming this challenge is the story of building capacity in plant sciences in Ethiopia.

A second problem addressed by the National Herbarium through the Ethiopian Flora Project was the editing and publishing of a technical work of considerable complexity to an internationally acceptable standard.

The Flora and the collection of reference specimens stimulate further taxonomic and other scientific research. This, in turn, makes the existing Flora no longer adequate, and it has thus to be revised from time to time. This is why the work of writing a Flora cannot be a one-off event, why there is a need to build a sustainable all-round capacity.

3. DESCRIPTION OF THE PRACTICE/INNOVATIVE EXPERIENCE AND ITS MAIN FEATURES

When ecological studies of the vegetation of Ethiopia were started in the 1960s and 1970s, it was only possible to identify locally less than 20 per cent of the plant specimens collected. Other studies in the 1960s and 1970s, such as the South West Forest Inventory carried out with British aid, had to send all the plant specimens to institutions outside Ethiopia for identification. In most of these cases, duplicate specimens with their written data were kept in the National Herbarium, but there have also been many studies where plant collections have been made but for which there are no duplicates of these specimens and their accompanying data in Ethiopia.

The most important data centre on the plant resources of Ethiopia is in the

University of Firenze (Florence) in Italy. Florence was Italy's R&D centre for the development of the agricultural and other plant and animal resources of its colonies. In the eighteenth and nineteenth centuries, Ethiopia attracted the attention of plant collectors from France, Germany and Great Britain. Since 1945, plant collectors have come from many countries, mostly in Europe, **but** also from North America and Japan. Thus, information on Ethiopia's plant resources is scattered throughout a number of institutions, mostly in Europe.

It was important for the National Herbarium to have access to these data sources if it was to be able to provide relevant information for the scientists, planners, policy-makers and other professionals working in Ethiopia. It was also essential for good collaboration to be developed between Ethiopian botanists and experienced taxonomic botanists with specialist knowledge working in various institutions outside Ethiopia.

A printed Flora is the most widely accepted method for making available the means to name the plants of an area along with the consolidated and synthesised information on those plants. The publication of Floras started in the last century and continues today. Ethiopia was one of the first Third World countries to have a Flora. *Tentamen Florae Abyssinicae* was written in Paris by Achille Richard and published between 1845 and 1851. Thus, the flora of Ethiopia has an important place in the scientific exploration of the plants of eastern Africa.

Writing a Flora is a long-term undertaking and modem Floras are mainly financed and printed by the same First World institutions and their governments that collected the data. For example, the *Flora of Tropical East Africa* covering Kenya, Tanzania and Uganda is being written and published from the Royal Botanic Gardens at Kew in the UK. Very few Third World countries have obtained the financial and political support to undertake this task by themselves. The corollary of this is that few Third World countries see the need or have the opportunity to train and gainfully employ nationals with skills in taxonomy and systematics.

The National Herbarium supported by the Ethiopian Flora Project is a notable exception to this situation.

Since 1980, the Herbarium has been running the Ethiopian Flora Project that has received continuous assured financial support from the Swedish Government. The central aim of the Project is to enable the National Herbarium to play its role in Ethiopia's development. This is to provide information for scientifically-based utilisation and conservation of the country's plant resources.

The objectives of the Ethiopian Flora Project are thus to:

(a) write up a Flora of Ethiopia within the shortest time possible;

(b) build up a National Herbarium and related library to be used as reference centres for professionals in fields which make use of the country's plant resources; and
(c) promote scientific activities in taxonomic botany and other plant-science fields relevant for Ethiopia's development.

OBTAINING AN ASSURED LONG-TERM SOURCE OF FUNDING

The major challenge in obtaining funding for the Ethiopian Flora Project was to find an institution that understood and was prepared to commit funds to the long-term task of writing and editing a Flora and training sufficient personnel to make the resulting institution self-sustaining.

The following convergence of information and interests convinced the funder of the merits of the Project:

(a) Ethiopian scientists frustrated for lack of a means to identify and name the plants they wanted to work with;
(b) professional taxonomists working in Europe identifying the lack of a Flora for Ethiopia as an important gap in the documentation of the plant resources of eastern Africa;
(c) an estimate of the magnitude of the task which lay ahead (6,500 to 7,000 species) and the time needed to complete writing and publishing the Flora (a minimum of 15 years); and
(d) the Swedish Agency for Research Co-operation with Developing Countries (SAREC) with a mandate to strengthen the research capacity of developing countries and advisors who understood the long-term nature of the Project.

Swedish Government support for research in Ethiopia started in 1979 and the Ethiopian Flora Project received its first phase of funding in 1980. The Project has been run in two-year phases and has been running continuously since that time. The Ethiopian Government provided support to the Project through the salaries of the senior staff of the Herbarium, some of the support staff, the building and utilities. All the funding is channelled through the Ethiopian Science and Technology Commission to Addis Ababa University and is handled according to government procedures.

Since 1994, the Flora Project has been amalgamated with other research projects in plant sciences under the title of the Ethiopian Biodiversity Project. In the meantime, discussions are taking place to enable Addis Ababa University to take on more of the financial responsibility for the National Herbarium staff and facilities, and various options are being studied. The most favoured is for the National Herbarium to become a semi-autonomous unit associated with the Faculty of Science of the University.

WRITING AND PUBLISHING THE FLORA

Contacts and collaboration

Flora-writing is an historical exercise. As well as looking at the current situation for any given plant, it is necessary to examine all previously collected material from the country concerned as well as adjacent areas. An author also needs to have access to critical literature, especially the original descriptions. The bulk of these historical collections and most critical literature are housed in institutions in Europe. The experienced staff of these institutions have usually concentrated on and become specialists in one or more groups of plants. It was thus important to seek the collaboration of these experts and their institutions in the writing of the Flora. In all, the writing of the Flora involves voluntary contributions from over 50 experienced taxonomists working in institutions in Europe, Africa and North America.

Initial contacts and correspondence with collaborating institutions and individuals were carried out from the European co-ordinating office in Uppsala University, Sweden. Now both the National Herbarium and Uppsala share this task, with the initiative coming from the National Herbarium.

The Flora Project has also provided equipment, opportunity and funding for collaborative fieldwork, especially extensive collecting in the previously poorly known parts of the country, particularly in the west and south. Collecting trips to northern Ethiopia have only been possible in the last six years. The National Herbarium now contains over 70,000 specimens.

Writing

Although more than half of the accounts for the Flora were assigned to specialists working outside Ethiopia, there were a number of families for which specialist help could not be found. As a result of staff development, Ethiopian scientists have done or are doing the writing of accounts for these families. Among these are some notoriously difficult groups like the 'Daisy' family ***(Compositae/Asteraceae),*** *Acanthaceae,* ***Aloaceae*** and several other petaloid monocotyledons. If a non-Ethiopian author finds it difficult to complete an account that he/she originally agreed to write, the task is taken over by a member of the Ethiopian team after proper consultation with the original author; often they become joint authors.

Most of the staff of the National Herbarium are now also assisting in the production of Floras of adjacent countries, particularly the *Flora of Somalia,* being written and edited in Uppsala and published by Kew, and the *Flora of Tropical East Africa,* also published by Kew.

Publishing the Flora

It was decided from the outset that the Flora volumes would be published within Ethiopia as this is the only way to ensure that the books would be available to individuals and institutions locally. It also ensured that the capacity to revise the Flora as the need arises would be developed. A Flora is textually and linguistically complex, having to conform to internationally recognised norms for presenting the information. It was thus realised that the printer would have to be given the finished 'camera-ready' pages from which to print the volumes. It was also decided that the volumes would be well illustrated to assist in the proper use of the terms and identification of the plants. Publishing locally has been achieved through:

(a) employing an editor with a background in taxonomic botany to work in Ethiopia and give on-the-job training in editorial skills;
(b) using computer equipment with high-quality desktop publishing software, a scanner and laser printer to produce the camera-ready pages;
(c) training an Ethiopian botanical illustrator;
(d) establishing a system with the staff of the National Herbarium for checking and copy-editing to ensure that information from collections housed in Ethiopia is accommodated in the accounts, and to enable the senior staff to become involved in the editorial process; and
(e) finding a printing house which would not only print 'at cost' but also print and bind the volumes to ensure durability. This was the government printing house attached to the Ministry of Education set up to print school textbooks.

The weakest part of the publishing activities has been distribution.

HUMAN RESOURCE DEVELOPMENT AND SUPPORTING INFRASTRUCTURE

An interesting feature of the Project is the low level of 'brain drain'. The ultimate aim was to have Ethiopian taxonomists trained so that more and more of the writing of the Flora could be done 'in house' and research into the flora could be self-maintaining.

The Project has trained Ethiopian scientists in a number of plant-science fields. At the start of the Project in 1980, there were one plant taxonomist and one plant ecologist associated with the National Herbarium. Over the following fifteen years, the Project has been directly instrumental in training five taxonomists and one plant physiologist, and indirectly responsible for training three ecologists, all in Swedish institutions. All except one of these re-

turned to work in Ethiopia. One senior taxonomist left Ethiopia for family reasons, but has continued writing up and contributing to the editing of Flora volumes. Factors that contributed to the success of this training programme include the following:

(a) The Ethiopian Government was convinced of the value of the Project.
(b) All the candidates did their research on local problems, which involved extensive fieldwork in Ethiopia when they returned, therefore, they were already familiar with how to conduct research in an Ethiopian setting.
(c) The research programmes for the taxonomists reinforced the Flora Project as they wrote accounts for the Flora as part of the training.
(d) In Sweden, all doctoral candidates have to have published at least three academic papers or a comprehensive monograph before they are allowed to present their thesis for defence. Thus, all trainees become familiar with the rigours and delights of academic publishing, and have the confidence to continue this activity after they return.
(e) A team spirit has developed within the National Herbarium, with no one individual trying to displace another in the academic hierarchy. There is now a 'critical mass' of trained taxonomists who find it more rewarding to work together than against one another.

The Flora Project realised the importance of adequate technical staff to support the qualified senior staff. The National Herbarium has a team of two senior technicians, one of whom has been with the Herbarium for more than 12 years, and three junior technicians. The National Herbarium also has a secretary and a driver.

The Project has enabled the National Herbarium to develop a small, specialised library that is managed by a properly qualified librarian. This has been built up as much from donations and exchanges as from purchasing books. For example, at the start of the Project, the Herbarium at Kew, UK donated copies of classic publications from the last century and the early part of this one. The library has also received valuable journal series donated by staff at Kew, Universities of Uppsala, Copenhagen and Oslo, and the French Embassy in Addis Ababa and 'grey' literature collected by the staff of the Herbarium. Books and journal articles are also received in exchange for Flora volumes and other publications of the Herbarium staff. The library is much used by graduate students, professionals working in various fields for the government, Ethiopians and expatriates working on development projects, and interested individuals.

[2] **Grey documents are those that are not properly published, i.e., either mimeographed, cyclostyled or, nowadays, laser printed, and which are produced in small numbers and only distributed locally.**

CATALYSING CAPACITY DEVELOPMENT IN OTHER PLANT-SCIENCE DISCIPLINES

The first discipline to get direct support from the Flora Project was plant physiology. On his return to Ethiopia, the plant physiologist trained under the Flora Project set up and pioneered studies into the physiology of indigenous trees. A major breakthrough from these studies has been the development of methods to get local trees to germinate easily. He also early on demonstrated that the technique of plant tissue culture could easily be handled locally.

Ecology has benefited greatly. There are now two fully qualified ecologists associated with the National Herbarium, one specialising in grassland ecology and the other in dry montane forests. The third plant ecologist was an employee of Alemaya University of Agriculture: he has now been appointed head of forestry research in the reorganised agricultural research system of Ethiopia. This scientist did his masters in plant taxonomy partly assisted by the Project and has contributed accounts for two families in the Flora. There is also close collaboration with animal ecologists, particularly those working with small mammals and birds.

All the plant-science disciplines associated with the National Herbarium and developed through the Ethiopian Flora Project now work together in soliciting support for multi-faceted projects associated with biodiversity. The different disciplines also have successful individual projects. Developing the confidence to go through the rigours of seeking funds and then utilising them effectively has been another of the learning experiences of the National Herbarium that enable it to look to the future with confidence.

A direct result of having well-qualified staff in botanical sciences has been the development of post-graduate teaching to masters level. This has made it possible for far more Ethiopians to continue with their education, as the costs of doing it locally are far lower than the costs of getting equivalent training outside the country. Another benefit of local post-graduate training is that research is done on local problems in the local setting. Now the Department of Biology is offering an international masters programme in Arid Land Biodiversity, mainly on the strength of the capacity in plant sciences developed as a result of the Ethiopian Flora Project.

4. DESCRIPTION OF THE INSTITUTION RESPONSIBLE AND ITS ORGANISATIONAL ASPECTS

The National Herbarium is part of the Department of Biology, based in the Faculty of Science of Addis Ababa University, Ethiopia. The Herbarium was established in 1959 with the plant collections of H.F. Mooney, an Irish

forestry expert. Now the Herbarium houses over 70,000 specimens and has vehicles and collecting equipment to continue studying and collecting the plants of the country.

The senior staff of the Herbarium are also teaching staff of the Department of Biology, a duty that interferes with research and collecting activities, but integrates teaching and research. Senior staff also have duties within the University hierarchy – presently the Dean of the Faculty of Science is also the Keeper of the Herbarium and Leader of the Ethiopian Flora Project. All staff are paid according to the regular scale for University employees – there are no special rates for Project staff, and project funding is administered through the financial services of the University. This will make it easy to phase out the Project without any negative impact on the staff.

The Flora Project has an editorial board. This board now meets once a year, alternating between Ethiopia and either Sweden or Denmark. The board reviews the progress in the writing of the Flora and makes decisions on how to share responsibilities to keep the Flora-writing on schedule and apportion funding.

5. PROBLEMS OR OBSTACLES ENCOUNTERED AND HOW THEY WERE OVERCOME

Running the Ethiopian Flora Project to help the National Herbarium meet its obligations as the national centre for information on Ethiopia's plant resources has met with many problems and constraints. In 1986,Tewolde Berhan G Egziabher enumerated these problems in his "Issues in the development of botany as a science in Ethiopia and the Ethiopian Flora Project". Although several have been overcome, others still remain. The following is a summary of the main problems.

BEING A THIRD WORLD SCIENTIST

Ethiopia did not have a culture that includes modern science. It is, therefore, often difficult for a student to explain his/her interest in science, and even more difficult if he/she wants to follow an obscure or new field of science. The following two anecdotes illustrate this:

When the first Project Leader was taking a sick aunt to hospital, a relative asked why he was not treating her himself as he was called 'doctor'. He replied that he was a doctor who studied plants, not people. The relative responded: 'Why, my son, did you not take a few more years of studying and become a doctor for humans instead of leaves?' When that remark was made over 30 years ago, there were only a handful of academically qualified Ethio-

pians.

The present Project Leader of the National Herbarium returned from Sweden with his doctorate in 1985. His relatives found it difficult to comprehend why he had chosen to be an academic rather than a businessman or trader.

Now there are many scientists and their role in the development of their country is better appreciated. However, many members of society in Ethiopia still find it difficult to accept the challenges of modern science, let alone understand and apply them to their everyday lives.

The other challenge to a Third World scientist is external and is rooted in the arrogance of Western society that cannot accept people from a non-Western background as 'good' scientists. The view is that Third World scientists may be tolerated if they leave their own countries and come to work under supervision in a Western setting, but they cannot produce good science in their own setting. This view extends to publishing the results of scientific work as research papers in journals. Correspondence in the INASP. Newsletters of 1996 highlighted this when a professor in the UK stated that it was not worthwhile to develop academic publications in developing countries. This view is not often openly expressed, but it can strongly influence interactions between Third World and First World scientists.

All the plant-science specialists associated with the National Herbarium have responded positively to this challenge. This is most evident in their involvement in the development of *Sinet: an Ethiopian Journal of Science,* which celebrates *25* years **of** publishing in 1998: five **of** the seven academics who have been editors-in-chief of the journal are botanists. *Sinet* is now internationally recognised, appearing in most of the major abstracting services. Another indication that this problem has been overcome is that most of the taxonomists in the National Herbarium are involved with preparing accounts for families for Floras of neighbouring countries, all being published in Europe. These successes are also helping to build a climate of co-operation among scientists, regardless of cultural background.

A third problem often faced by a Third World scientist arises from the fear of academic displacement by the students he/she has trained. This can work against developing a critical number of scientists in a discipline to give them a voice and credence amongst other scientists and society. A senior scientist can develop 'prima donna' behaviour in order to protect the position he/she has attained and this discourages younger colleagues from joining h i m / her. Students can progress further than their teachers and then come to despise and replace them. Their time and energy are then transferred from doing science to denigrating one another. These last problems are not peculiar to Third

' INASP = International Network for the Availability **of** Scientific Publications

World scientists, but their effects are more devastating than in the First World because the scientists are fewer.

The National Herbarium has had brushes with some of these problems, but they have never stopped dialogue among the senior staff. Factors in avoiding these problems have included:

(a) good personnel management by leaders in the Herbarium;
(b) regular meetings where problems are discussed and solutions suggested;
(c) social support among colleagues and their families, particularly where staff have been out for extended periods during training or working for the Flora; and
(d) sharing of administrative and technical tasks.

THIRD WORLD BUREAUCRACY AND THE SHORT-TERM VIEW

Getting the bureaucracy in any institution to listen and become sympathetic to a scientist's interests is a challenge even in the First World. It is an almost impossible task in the Third World. It becomes marginally better when scientists fill at least some of the senior administrative posts. When the Ethiopian Flora Project was started, the Ethiopian Government had just established the Ethiopian Science and Technology Commission (ESTC). The Commissioner took a personal interest in the negotiations for the Project and in following up its progress. The same was true of the President of Addis Ababa University and its Research and Publications Officer. Without the understanding and goodwill of these officers, it would have been impossible for the scientists who developed the Project to have seen it through to agreement with the Swedish Government.

However, goodwill at the top and enthusiasm at the base have to contend with a large established bureaucracy in the middle that is manned by people who have little appreciation of science. The closest that most **of** them have ever got to botany is probably when they undertook some basic studies of plants in school. Most of them do not have a rural background, or if they do have such a background, they have been 'educated' to despise and forget it. These attitudes come into conflict with the interests of scientists in nearly every administrative task: financial transactions, employing and promoting technical staff, making travel arrangements for visits abroad and bringing expatriate colleagues into Ethiopia.

These problems require much tact and patience on the part **of** the scientist, and an interest in trying to understand the needs of the scientist on the part of the bureaucrat. Fortunately, a dialogue has developed between the per-

sonnel in Addis Ababa University's bureaucracy and the scientists. The University has recently decentralised many of its basic services so that academic and administrative staff can have more direct contacts. This is smoothing out the relationship between scientist and bureaucrat within the University.

The same cannot be said of the ESTC. Here scientists fill all the main posts. But this is not necessarily an advantage. None of these scientists have taxonomic training. It has thus been difficult to get them to appreciate the long-term planning in the Flora Project and the requirement for frequent travel to herbaria in Europe by the senior staff of the National Herbarium. It was not until the Commissioner and a group of senior staff from the ESTC held an in-depth discussion with the Herbarium staff a few years ago that a proper understanding was arrived at in relation to the problems in publishing the Flora.

COMMUNICATION AND TRAVEL

The writing of the Flora involves much correspondence with collaborating scientists. Initially, the staff of the National Herbarium did not know who could be invited to contribute to the Flora, **so** this task was handled by the European co-ordinator in Uppsala. Now the task is shared and a system has evolved so that both editorial offices are informed of the contacts made.

Much of the Flora Project was implemented when the only means of written communication was by post, and the postal services in Africa are notoriously unreliable. Although electronic and fax mail now make communicating with the rest of the world much faster, they are only as reliable as the telephone service they depend on. This service in Ethiopia is not very good and leaves subscribers frustrated. Thus, ordinary mail is still the best way to send formatted pages containing complicated text and illustrations to authors, especially as the introduction of courier services has made postal services both reliable and fast.

For the first 11 years of the Project, travel to northern Ethiopia, particularly Tigray, was not possible. Thus, Flora-writing had to depend on already collected specimens from these areas. Since the change in government in 1991, several collecting trips have been made to Tigray and Gondar. Travel in the Somali Region (Ogaden) of Ethiopia has always been difficult.

Travel to institutions outside Ethiopia has been a major item in the funding of the Flora Project. Most of the senior staff spend their long vacations and sabbatical leaves working in Europe. In 1980, there was a problem in choosing a base in Europe from which Flora work could be done: Uppsala is the European co-ordinating office but its collections of African plants are limited. The most important collections for Ethiopia are in Florence – Italy, Kew

– UK, and Paris – France. In 1980, the Keeper of the Herbarium at Kew offered Ethiopian Flora Project staff a base, and this relationship has continued uninterrupted.

The Flora Project has also enabled good working relationships to be developed with all the major herbaria in Europe, Missouri Botanic Gardens in the USA, the East African Herbarium in Kenya and some other institutions in Africa. Maintaining good connections in Africa is, however, still difficult because of the generally poorly developed intra-continent postal and telecommunications services.

FINANCIAL TRANSACTIONS

For the first 10 years, it was not possible for a government-based activity like the Flora Project to send money out of the country and thus, it could not make any direct purchases from abroad. It was even difficult to purchase airline tickets. Thus, Addis Ababa University, on behalf of the Flora Project, only received the minimum amount of funding to run activities in Ethiopia. The remaining funds stayed in Uppsala where they were used by the European co-ordinator to pay the salaries of the expatriate staff in Kew and purchase items for the Project. Airline tickets and the subsistence allowance for Ethiopian staff working in Europe were also disbursed from Uppsala. This was not a satisfactory arrangement because it resulted in delays in the transferring of funds and the paying of allowances to Ethiopian staff travelling to Europe. This indirect purchasing method also did not allow for satisfactory procurement of books. There were some instances of expenditures which were not in line with the wishes of the Herbarium staff in Addis Ababa.

Misunderstandings over the use of funds and the pace of publishing of Flora volumes nearly caused a breakdown in collaboration between the National Herbarium and Uppsala. In 1992, it was therefore agreed that the editorial board should meet annually. Prior to this crisis, the board had met only once in 1986. At the 1993 meeting, frank discussions and a detailed review of the progress in publishing the Flora enabled good relations to be re-established. It was also agreed that the Project Leader based in the National Herbarium would approve all expenditures before they were carried out.

The 1994/95 phase of the Project also saw a major change in the allocation of funds, with most coming to Ethiopia as the Government had made it possible for projects like the Flora Project to make external purchases and send funds abroad. Since this time, the National Herbarium has been able to purchase airline tickets, arrange subsistence support and purchase books from abroad through the Ethiopian Science and Technology Commission.

LOCAL PUBLISHING

The biggest challenge for local publishing was firstly that of finding appropriate computer equipment. This was in 1984 and local suppliers were not helpful: it was before 'desktop publishing' appeared as a computer application. The editor found the solution in the International Livestock Centre for Africa, which had a well-staffed and well-equipped computer department. Compatible sets of equipment and software were installed in the then four nodes of the Project. This equipment functioned very well for six years and the first Flora volume was produced with it. However, by then, there had been considerable developments in computer technology and software. The challenge since then has been how and when to update this equipment.

The most serious problems after the first volume appeared were how to accommodate the changes in computer technology and software which, in theory, could speed up the editing and formatting process. This involved on-the-job training of editorial assistants and establishing a system to involve the senior staff of the Herbarium in the editorial process. The latter undertaking has been successful, with senior staff working as co-editors for all the Flora volumes processed in Ethiopia. However, it has not been possible to retain the editorial assistants because they were only contractual employees with no prospects for further training or other forms of advancement within the Project. There is also neither security nor benefits (pension, health insurance) in being a contractual employee. Only by the University taking responsibility for the employment of a staff

complement appropriate for a functioning and self-sustaining institution can this problem be solved.

6. EFFECTS OF THE PRACTICE/INNOVATIVE EXPERIENCE

The support for the National Herbarium through the Ethiopian Flora Project has enabled the Herbarium to become well staffed and equipped to meet its national obligations. It is also recognised as the best-equipped and staffed institution of its kind in Sub-Saharan Africa, excluding the Republic of South Africa. The most important step for the Herbarium to become a self-sustaining institution is for the Government to take full responsibility for the staff and facilities needed to run it.

The Herbarium can now function on a government budget, but certainly this would not allow it to grow and would severely curtail research activities. However, the Herbarium staff have the international standing and are experienced in collaborating with institutions and individuals from outside Ethiopia. They have developed projects focusing on specific aspects of the flora

and have obtained funds to run these, which contribute to strengthening the National Herbarium.

Last, but not least, the Flora Project has acted as a catalyst for the development of complementary disciplines in the plant sciences, particularly ecology and physiology. This has a synergistic effect on the building up of biology as a science in Ethiopia. For example, staff of the National Herbarium played a key role in the establishment of the Biological Society of Ethiopia, and plant scientists have continued to be key members of the Executive Committee of this society. There has also been positive feedback into teaching and research, with a strong botany section in the post-graduate masters programme and this year, the Biology Department has started offering a regional masters programme in 'Arid Land Biodiversity'.

7. SUITABILITY AND POSSIBILITY FOR UPSCALING

The Ethiopian Flora Project operates at the national level. There is thus no scope for upscaling within the country. However, there is a need for regional co-ordination in the development of taxonomic skills. The Convention on Biological Diversity has recognised the need for a 'taxonomic initiative' to provide the human resources and infrastructure to study, name and catalogue the diversity of life. One such initiative is the Botanical-Zoological Taxonomy Network for East Africa (BOZONET) being developed through the regional Global Environmental Facility (GEF) office in Tanzania. The experiences of the National Herbarium in developing and running the Ethiopian Flora Project could be useful in the development of BOZONET.

8. SIGNIFICANCE FOR (AND IMPACT ON) POLICY-MAKING

The Ethiopian Flora Project support for the National Herbarium has impacted several policies focusing on the natural resources of the country. The first of these is the Conservation Strategy of Ethiopia (CSE). The CSE director came from the National Herbarium and other senior staff were directly involved in compiling the data on the biological resources of the country.

Herbarium staff have been involved in developing the national policy documents on Biodiversity, Genetic Resources, and the Seed Industry. In March 1998, representatives from the National Herbarium participated in the OAU/**STRC** workshop which drew up the Draft Legislation on Access to Biological Resources and Community Rights and the Draft African Convention for the Protection, Conservation and Sustainable Use of Biological Diversity and

[4] Organisation **of** African Unity/Scientific and Technical Research Commission

Genetic Resources and Related Knowledge which was adopted by the **OAU** Council of Ministers' Meeting in Ouagadougou in June 1998. Experience with the Flora Project has enabled the senior staff **of** the National Herbarium to appreciate both the value and the vulnerability of the country's biological resources. They have also been made aware that they have to be involved in developing the policies to protect and use these resources.

9. POSSIBILITY AND SCOPE OF TRANSFERRING TO OTHER COMMUNITIES OR COUNTRIES

The Convention on Biological Diversity has highlighted the importance of being able to name the biological resources around us. Genetic engineering has made it possible for genes from very different organisms to be combined. Thus, there are two drives bringing the 'old-fashioned' disciplines of taxonomy and systematics out of the cupboards.

One is the need for all the biodiversity-rich countries, particularly those of the Third World situated between the tropics **of** Capricorn and Cancer, to know and understand their biological resources. Only then can they carry out the research needed for their rational use and conservation. Only then can they also protect them from the predatory advances of the modern biotechnology (genetic engineering) corporations.

The other is the insatiable appetite of modern biotechnology that advances itself as the new panacea to feed the world and cure all its ills. It claims it can feed the world by producing a few 'super crops' resistant to all pests and diseases, able to withstand the onslaughts of chemicals that knock out all competing life forms, particularly weeds, and producing super bumper harvests despite a world in the throes of dramatic climate change.

In their effort to profit from the fear of disease and death, the transnational corporations are scouring the world for all types of cures so they can sell these to people in the First World under the promise that they will live healthier and longer lives. They are using the traditional knowledge **of** indigenous peoples and local communities as shortcuts to the medicinal plants of the Third World, while hoping that minimal or no benefits accrue to these people and to their governments.

The Convention on Biological Diversity recognises the sovereign rights of governments over their resources. The tragedy is that the taxonomic knowledge of what those resources are **is** mostly in the hands of First World institutions developed during colonial times. It is the conviction of the authors of this report that the experience with the Ethiopian Flora Project can help design effectivepartnerships between developing countries and donors in building capacity in taxonomy and in studying and solving the problems involved

in the sustainable use of, and the sharing of benefits arising from, biodiversity which are now unfolding.

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