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IN THE AMOUNT OF US$ 1.89 MILLION

TO

THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

FOR

CONSERVATION AND SUSTAINABLE USE OF MEDICINAL PLANTS

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Sustainable Development Department
Agriculture and Rural Development
Africa Region

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ABBREVIATIONS AND ACRONYMS

AAU	Addis Ababa University
BMNP	Bale Mountains National Park
CAS	Country Assistance Strategy
CSMPP	Conservation and Sustainable Use of Medicinal Plants Project
DACA	Drug Administration and Control Authority
DDR	Department of Drug Research
DOB	Department of Biology
EORC	Essential Oil Research Center
ERV	Exceptional Resource Values
ET	Ethiopia
ETB	Ethiopian birr
FGB	Field genebanks
FVM	Faculty of Veterinary Medicine
FZS	Frankfurt Zoological Society
GEF	Global Environmental Facility
GEO	Global Environment Objectives
GIS	Geographical information system
GMP	General Management Plan
IBC	Institute of Biodiversity Conservation
IDA	International Development Agency
IPR	Intellectual property rights
ISR	Implementation Status and Results Report
IUCN	World Conservation Union
KPI	Key Performance Indicator
KTA	Knowledge Transfer Agreement
LIL	Learning and Innovation Lending
M&E	Monitoring and Evaluation
MIS	Management Information System
MOH	Ministry of Health
MOU	Memorandum of Understanding
MTR	Mid-term Review
NGO	Nongovernmental organization
NH	National Herbarium
NMDP	National Medicinal Plants Database
PAD	Project Appraisal Document
PC	Project Coordinator
PCMU	Project Coordination and Monitoring Unit
PDO	Project Development Objective
PIU	Project Implementation Unit

PRA	Participatory Rural Appraisal
PSR	Project Status Report
PTS	Project Tracking System
QAG	Quality Assurance Group
SDR	Special Drawing Rights
SOP	School of Pharmacy
SSA	Sub Saharan African
THA	Traditional Healer Association
UNDP	United Nations Development Programme
WHO	World Health Organization
WWF	World Wildlife Fund

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ETHIOPIA

Conservation and Sustainable Use of Medicinal Plants

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D A T A S H E E T

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1. Project Context, Development, and Global Environment Objectives Design

1.1 Context at Appraisal

1. Ethiopia's diverse ecologies contain a rich array of indigenous flora, including medicinal plants considered vital to human and animal health. Many of these species are now at risk, owing to increasing human encroachment on the wild forests, woodlands, and grasslands where they grow and from which they are traditionally gathered.

2. The government, through its Health and National Drug Policies, aims to develop a healthcare system that integrates both traditional and modern medical resources. Such a system would rely in part on research and treatments based on indigenous medicinal plants. It would yield economic benefits for the many people whose livelihoods are derived from medicinal plants, and it would yield environmental benefits from the conservation and sustainable management of medicinal plant resources. Unfortunately the institutional capacity to develop a healthcare system based on medicinal plants has been limited in Ethiopia. Very little infrastructure was available for conducting research or providing information on the safety and efficacy of plant remedies. Very little quantitative data was available on the potential benefits of (i) using indigenous medicinal plants to sustain human and animal health, (ii) improving in situ conservation of medicinal plant species, and (iii) improving the management of plant habitats. The Conservation and Sustainable Use of Medicinal Plants Project, cofinanced with International Development Agency (IDA) and Global Environment Facility (GEF) resources, was designed as a learning and innovation lending (LIL) project to address some of these issues.

1.2 Original Project Development Objectives (PDOs) and Key Indicators (as approved)

3. The project's overall objective was to initiate research on the conservation, management, and sustainable use of indigenous medicinal plants for human and livestock health in Ethiopia. Specific objectives were to: (i) improve and strengthen the capacity of national institutions to conduct research on the safety, efficacy, and dosages of selected medicinal plants commonly used to treat human diseases (tapeworm infections, bronchopneumonia, and hypertension) and livestock diseases (tapeworm infections, mastitis, and dermatophilosis); (ii) identify and document indigenous medicinal plants commonly used to treat major human diseases; (iii) initiate studies to ensure the safe use of effective plant remedies for major human and livestock diseases; (iv) assess the economic benefits at the national level of using medicinal plants in human and livestock healthcare and explore export potential; (v) develop a national medicinal plants database; and (vi) support *in situ* conservation and management and initiate *ex situ* cultivation of medicinal plants.

1.3 Original Global Environment Objective (GEO) and Key Indicators (as approved)

4. The Global Environment Objective is to promote *in situ* conservation and sustainable use of medicinal plants in and around a site of global significance: the Bale Mountains National Park (BMNP).

1.4 Revised PDOs (as approved by original approving authority) and Key Indicators, and reasons/justification

There were no revisions to the PDO.

1.5 Revised GEO (as approved by original approving authority) and Key Indicators, and reasons/justification

The GEO was not formally revised.

1.6 Main Beneficiaries

5. The project was intended to benefit three main groups. First, the Government of Ethiopia would benefit by acquiring essential information for planning programs related to medicinal plant resources and establishing stronger institutions to implement such plans. Second, research agencies, such as the

Department of Drug Research (DDR), the Addis Ababa University (AAU), the School of Pharmacy (SOP) and the Faculty of Veterinary Medicine (FVM) would gain greater capacity to complete preclinical and clinical trials of selected plant-based medicines. Third, communities located in and around the BMNP, which depend on medicinal plants and herbal remedies for their healthcare and livelihoods, would benefit from the implementation of a managed harvesting regime for medicinal plants, the improved protection of medicinal plant biodiversity within the national park, the wider availability of safe and efficacious herbal remedies, and the additional income from medicinal plants. Within these communities, women, poor households, and traditional healers would play an especially important role in identifying and implementing strategies for conserving, managing, cultivating, and harvesting medicinal plants. Traditional healers would also benefit from technical training, workshops, and establishing and consolidating professional associations to increase the formal recognition of their role. In addition, they would gain access to information from research facilities, primarily through mass awareness programs on the safety, efficacy, and dosages of selected herbal formulations.

6. Aside from these local benefits, national benefits would be derived from better knowledge of the indigenous medicinal plants commonly used to treat major human and livestock diseases. The development of a national database on medicinal plants would support the formulation and implementation of national programs for conservation, cultivation, and sustainable use of medicinal plants. National institutions and agricultural training centers would gain from their improved capacity to implement such programs. Finally, global benefits would arise from the conservation and management of endemic and threatened species within the BMNP.

1.7 Original Components (as approved)

7. The project was prepared and financed jointly by IDA and GEF under the LIL. Its three components (described in greater detail below) were: (i) institutional strengthening, human resource development, and project monitoring and evaluation; (ii) studies, research, and database development; and (iii) *in situ* conservation and sustainable use in BMNP. The first and second components were financed by IDA; the third was financed by GEF. The project was specifically designed to support institutional development through an innovative scheme for biodiversity conservation tailored to benefit nearby communities directly.

8. In line with its focus on conserving biodiversity and building institutions, the project would operate in an area limited to the BMNP and surrounding woredas and would work only with specific government institutions.

9. The project was to be executed over four years for the IDA-funded components and five years for the GEF-funded component. Overall responsibility for project implementation rested with the Institute of Biodiversity Conservation (IBC), which established a project coordination office to handle day-to-day coordination. The Oromiya Bureau of Agriculture and Rural Development played a critical role in implementing *in situ* conservation and *ex situ* cultivation by supporting the development of cultivation guidelines, field genebanks (FGBs), and mass awareness programs.

Component 1: Institutional Strengthening, Human Resource Development, and Project Monitoring and Evaluation

10. This component strengthened capacity within IBCR by providing technical advisory services and staff training, and it also strengthened the capacity of human resources in collaborating institutions to implement project activities. Collaborating institutions were given resources to establish a medicinal plant FGB in conjunction with traditional healers. Through this component, support was also provided to develop an intellectual property rights (IPR) policy, develop guidelines for sharing traditional knowledge about medicinal plants, and establish and operate a Project Coordination and Monitoring Unit (PCMU).

Component 2: Studies, Research, and Database Development

11. This component focused on five activities: (i) studies of methods for collecting, analyzing, and interpreting quantitative data on national socioeconomic benefits derived from medicinal plants used in human and livestock healthcare; (ii) ethnomedical surveys to explore the use of medicinal plants and traditional healthcare practices in preventing HIV and mitigating the impacts of AIDS; (iii) research on the propagation and cultivation of selected indigenous plants used to treat human and livestock diseases; (iv) studies on the extraction, standardization, safety, efficacy, dosage testing, and formulation of phytomedicines for three human and three livestock diseases; and (v) the identification, documentation, and development of a national database for indigenous medicinal plants.

Component 3: In Situ Conservation and Sustainable Use in BMNP

12. This component focused on six activities: (i) a detailed socioeconomic survey; (ii) development and implementation of management options and guidelines for sustainable harvesting of medicinal plants and/or their products, and the provision of technical advisory services and training; (iii) a monitoring exercise to assess the impacts of harvesting medicinal plants (including surveys of the levels of local and national use of plants harvested from BMNP); (iv) pilot farmer/healer trials for cultivating a selection of threatened and indigenous species in home gardens as well as boundary and buffer zones of the BMNP, to supply local needs and provide an alternative source of income; (v) training for BMNP administrative and technical staff (in the conservation, management, and monitoring of medicinal plants within the park and adjacent forests) and farmers (in plant propagation and cultivation trials); and (vi) educational and mass awareness campaigns.

1.8 Revised Components

The design of the project remained unchanged until project completion.

1.9 Other significant changes

13. Owing to uncertainties associated with several activities, project costing was generous and conservative. Prior to the Mid-term Review (MTR), a Quality Enhancement Review (QER) meeting was held on February 11, 2004. The meeting recommended a careful review of the current implementation arrangements and the original project budget. Actual costs turned out to be less than estimated, and funds could thus be canceled without significantly reducing planned activities or discarding the original objectives. As a consequence, a total of SDR 779,746 (equivalent to US$ 1,206,938) of the IDA credit and US$ 977,000 of the GEF was cancelled after the MTR in January 2005.

14. Following studies carried out by the project, several adjustments in strategies for conserving biodiversity (such as alternative livelihood schemes and a General Management Plan for BMNP) were introduced. In developing a management plan for BMNP, the project involved nongovernmental organizations (NGOs) with specialized skills and stronger local experience to permit activities to be conducted in a responsive and decentralized way.

15. Closing dates for both the IDA credit and the GEF were extended for six months to permit some final activities to be completed. The IDA credit was extended until June 30, 2006 (original closing date was December 31, 2005) and the GEF was extended until June 30, 2007 (original closing date was December 31, 2006). The GEF closing date differed from the IDA closing date because of the longer time frame for community based activities.

2. KEY FACTORS AFFECTING IMPLEMENTATION AND OUTCOMES

2.1 Project Preparation, Design, and Quality at Entry

16. The project was not subject to review by the Quality Assurance Group (QAG). Overall, quality at entry is rated moderately satisfactory by this ICR for four reasons. First, the LIL was consistent with the objectives of the 2000 Country Assistance Strategy (CAS). Second, the project supported the government's health sector strategy. Third, the project was technically well conceived in its learning and innovation objectives. Fourth, although the project was designed to incorporate lessons from previous projects[1], it was somewhat ambitious and challenging, owing to the involvement of numerous agencies and stakeholders, the limited cooperation between collaborating institutes, and consequent delays.

17. The project document identified several critical risks and mitigating measures. Two risks appeared substantial: practitioners of traditional medicine might not share their knowledge, and communities in the Bale Mountains area might not be motivated to collaborate and to adopt practices for sustainable management and harvesting of medicinal plants. The positive relationship established between the PCMU, traditional healers, and the Bank supervision missions helped overcome the healers' reticence, however, and the healers helped to ensure that the communities were engaged in the resource management process.

18. The participatory process was adequate. A national workshop on conservation and sustainable use of medicinal plants was carried out at the time of appraisal. The workshop was attended by representatives from government institutions, members of traditional healers associations (THA), traditional health practitioners, academics, and NGO staff.

2.2 Implementation

19. A number of factors contributed to or strengthened the project's implementation. One important contribution was the substantial improvement in capacity within DDR, SOP, and FVM to conduct validation trials of selected phytomedicines, especially through training, study tours, and equipment purchases (for more detail on capacity building, see annex 10). The validation process involved ethical and clinical trials that proved lengthier than expected and had not been foreseen in the initial design of the project.

20. The LIL aspects of the project triggered a number of ideas and activities. They raised awareness among various institutions, including national and regional THAs, of the importance of traditional contributions to healthcare; identified the economic importance of conserving, managing, and sustainably using medicinal plants; increased communities' willingness to participate in the decision-making process; and reinforced the awareness that communication between parties must be nurtured and strengthened.

21. The project targeted a rural population without ready access to healthcare and areas where the loss of biodiversity was high and rapid. Despite setbacks, such as the high turnover of project staff in the Oromiya Bureau of Agriculture and Rural Development, the mass awareness program directed at traditional healers in the project areas successfully communicated the essentials of *in situ* conservation

[1] (i) ET Agricultural Research Project; (ii) ET WHO Project implemented by the Department of Drug and Research; (ii) UNDP/GET Dynamic Farmer-Based Approach to the Conservation of Ethiopia's Plant Genetic Resources implemented by IBCR; (iv) WWF/DUTCH ICDP Project in the Bale Mountains; (v) Ethiopia: the German Government supported Integrated Forest Management Project (IFMP) and Forestry Genetic Resources Project (Assistance to the Institute of Biodiversity Conservation and Research (IBCR)); (vi) GEF Sri Lanka Conservation and Sustainable use of Medicinal Plants Project; and (vii) Bank supported Kerala Forestry Project in India.

and ex situ cultivation. Farmer/healers' ability to diversify their incomes, a longer-term gain, was improved through training in improved cultivation of medicinal plants. This capacity was conspicuously absent at the start of the project.

22. Project implementation was delayed for several reasons. Implementation was slow during the initial stages because of the innovative nature of the project's activities, weak institutional capacity, and insufficient experience in the government and Project Implementation Unit (PIU) with respect to Bank requirements and procedures, especially in procurement and financial management. Staff turnover was high (partly for external reasons, such as higher salaries paid by other projects). Other delays were caused by inadequate counterpart funds, insufficient commitment to project objectives among collaborating institutions, the absence of a mechanism to implement and enforce memoranda of understanding (MOUs), and inadequate follow-up by the Institute of Biodiversity Conservation (IBC). The absence of clear guidelines, procedures, and protocols for the validation of phytomedicines also impeded progress.

23. Because of the considerable number of agencies and stakeholders involved, coordination was cumbersome, and cooperation between the 13 participating institutions was limited. By the end of 2003, the disbursement rate was lagging the original estimates by 63 percent, resulting in a partial cancellation of funds in January 2005 (as mentioned in paragraph 1.9).

24. Because a systematic monitoring and evaluation (M&E) mechanism was not in place early on, information was not available on time. As a result, an intensive review of M&E for the project was proposed during the MTR (see section 2.3). The MTR led to a number of agreed actions:

- Hiring of a regional coordinator and a district coordinator and accountant to facilitate action at the woreda level.
- Completion of the in-depth biological survey.
- Approval of the ethical clearance for conducting clinical trials of selected medicinal plants.
- Finalization of the policy guideline on IPR.
- Development of a program for strengthening THAs.
- Establishment of a mechanism for compensating services rendered by traditional healers.
- Completion of the management information system (MIS) study.
- Revision and implementation of the salary scale for project staff.
- Strengthening the role of the PIU.
- Completion of the national economic benefit study.

25. The establishment of coordination offices at the zonal level compensated for the initial delays and enabled the project to achieve most of its objectives during the last two years (see section 3.2). Following the MTR, the appointment of a full-time Coordinator to work closely with the woreda focal persons and traditional healers facilitated the work, despite staff turnover. Similarly, the project provided seven motorcycles to participating woredas to facilitate staff mobility.

2.3 Monitoring and Evaluation Design, Implementation, and Utilization

26. As noted, the lack of systematic M&E at the start of the project partly explains the laxity of the project coordination office and IBC with regard to monitoring. The initial M&E effort was an input/output system, which produced reports on indicators, tracked procurement activities, and tracked surveys, meetings, and workshops. Reporting was compromised, however, because information was not available on time from the large number of participants. This was recognized as a major weakness during the early part of project implementation, and a revised M&E system, which also included a set of monitoring indicators, was finalized during the MTR. Subsequently, the timeliness of reporting improved.

27. The project also developed a computerized MIS consisting of two major subsystems: (i) the National Medicinal Plants Database (NMPD) and (ii) a Project Tracking System (PTS). The NMPD

prototype was developed and a manual for M&E prepared to improve follow-up and reporting on the implementation of project activities and produce periodic reports.

28. An expert in M&E for the project helped develop the MIS; determined data availability, identified data gaps, and suggested measures to improve data collection; prepared formats for monthly, quarterly, and annual reports; devised a system to obtain timely reports from project implementers; and prepared a user-friendly manual, which was used as the base for all M&E activities.

2.4 Safeguard and Fiduciary Compliance

29. The project was an environmental category C and had no negative or adverse environmental impact.

30. As mentioned, limited familiarity with finance and procurement procedures slowed implementation. The project obtained more reliable financial information with its new financial management system and timely submission of quarterly reports. Procurement suffered owing to the lack of trained staff and poor familiarity with procurement rules and procedures, but training in Bank procedures solved this problem. The internal control system put in place was adequate, and audit reports were submitted on time.

2.5 Post-completion Operation/Next Phase

31. In October 2007, the Government of Ethiopia, through a letter from the Ministry of Finance, indicated its desire for follow-up activities focusing on: *in situ* conservation and *ex situ* cultivation of selected medicinal plants; integration of selected phytomedicines into the Ministry of Health's (MOH's) primary healthcare system; and expanding GEF conservation activities in relevant sites. Justification for a second phase of the project was prepared, an outline for a concept is being finalized, and the government is committed to providing a budget envelope. MOH and AAU are providing funds for DDR, SOP, and FVM to continue the preclinical and human clinical trials initiated under the project. IBC continues to provide financial support to the healers' nursery and home garden projects and the FGBs.

32. In addition, MOH now has a separate department to review and update national policies and strategies for the use of medicinal plants and for integrating and optimizing collaboration among government institutions and agencies working in the traditional healthcare system. A sustainability strategy was prepared in May 2007.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design, and Implementation

33. The LIL was consistent with the objectives of the 2000 CAS and the 2006 Interim CAS, which aims to at least double health expenditures as well as dramatically expand the provision of basic services by local governments, especially in rural areas. The project formed part of Ethiopia's commitment to improve healthcare and facilitate and integrate traditional and modern health systems. (As mentioned, national policies and strategies for using medicinal plants are now reviewed and updated by a separate department of MOH). Additionally, the project was aligned with Ethiopia's Conservation Strategy and Environmental Policy as well as its Biodiversity Conservation and Development Strategy, in which the conservation and sustainable use of medicinal plants is a priority, and with policies and strategies that directly address the conservation of biodiversity.

34. The project was designed to help integrate traditional and modern medicine by identifying phytomedicines based on traditional plant remedies and fostering longer-term conservation of threatened medicinal plants. The project's design reflected proper diagnosis of a development priority that remains

relevant.

3.2 Achievement of PDOs and GEOs

35. Prior to the project, Ethiopia had little institutional capacity to develop human and animal healthcare systems based on the traditional use of medicinal plants and to integrate these systems with modern ones. Research and information on the extraction, standardization, safety, efficacy, dosage, and formulation of plant remedies were scarce. Still other challenges were posed by the lack of quantitative data on the economic benefits of medicinal plants and the absence of strategies for their sustained conservation. Key conservation issues included habitat degradation, inadequate *in situ* conservation, and unsustainable medicinal plant collection practices. Given these needs, the project focused on building capacity and establishing processes, not on achieving higher-level outcomes. The project pursued these goals through its three components.

36. Under Component 1, "Institutional Strengthening and Capacity Development," a first objective was to *improve and strengthen national institutions' capacity to conduct research on the safety, efficacy, and dosage of selected medicinal plants commonly used to treat human diseases (tapeworm infections, bronchopneumonia, and hypertension) and livestock diseases (tapeworm infections, mastitis, and dermatophilosis).* Two major activities were undertaken to achieve this objective:

- *Strengthen the capacity of IBC* (achieved): The project increased awareness within ICB of the potential for conserving and using medicinal plants more sustainably, both in the wild and through cultivation, and it provided knowledge and tools for expanding efforts in this direction. It also provided additional vehicles, computer equipment, and training for IBC staff. Furthermore, it brought IBC into close contact with MOH (and its efforts to integrate traditional and modern medicine) by focusing on the high demand for medicinal plants. Establishing close collaboration between the two parties was an obvious necessity. The project succeeded in building institutional capacity to undertake project activities and conduct research on the safety, efficacy, dosage, and formulation of phytomedicines for specific human and livestock diseases.
- *Develop the human resource capacity in collaborating institutions to implement project activities* (achieved): An assessment of human resource and institutional capacity identified needs for training and other inputs. A training plan was prepared and implemented (see annex 10).

37. A second objective under Component 1 was to *identify and document selected indigenous plants commonly used to treat major human diseases*. Three major activities were undertaken:

- *Establish a field gene bank* (achieved)*:* The project established two FGBs for medicinal plants. The FGBs provide locations that are topographically and climatically suited to the multiplication and conservation of medicinal plant species (collected from surrounding areas where they are under threat) and make the plants accessible to traditional practitioners. The first FGB was established at the Essential Oil Research Center (EORC), located in Wondo Genet. A qualified agronomist maintains the site. The genebank conducts propagation and cultivation studies for two species (*Glinus lotoides* and *Plumbago zeylanic)* included in the validation trials. To date, the Wondo Genet gene bank conserves 166 accessions; the genus and species of 113 of the accessions have been identified. The second genebank, established at Goba, has collected and conserved 117 accessions and identified 101 species. The two banks are well maintained and their accessions are regarded as representative of local medicinal plant biodiversity. The agronomists and other genebank staff deserve full credit for their efforts. There is every reason to believe that FGBs will contribute significantly to conserving and managing medicinal plants, and this activity, which progressed well from the

beginning, should expand to other regions. The first two FGBs provide an excellent example of how such banks could be established.

- *Develop IPR policy and guidelines for sharing traditional knowledge* (partially achieved): A Model Knowledge Transfer Agreement (KTA) was developed to address intellectual property claims on the use and transfer of traditional medicines and was shared with traditional healers. The Model KTA is harmonized with the proclamation on Access to Genetic Resources and Community Knowledge and Benefit Sharing, ratified by Parliament in February, 2006. A draft IPR policy and its corresponding guidelines, produced in consultation with traditional healers, researchers, and government institutions, await government approval. In addition, the project initiated development of regulations for traditional medicine, which are to be submitted by MOH to the Council of Ministers for approval. The traditional medicine unit being established under MOH will give official recognition and support to the sector.

- *Establish a functioning PCMU* (achieved): A unit responsible for implementing the project was established. Initial problems related to staff turnover were resolved. The Project Coordinator (PC) stayed with the project until the final six months, which guaranteed continuity in project activities, ensured that trust developed between management and stakeholders, and created much better collaboration among the institutions. Improved collaboration was reflected in the success of mission workshops at which stakeholders reported on their activities.

38. Under Component 2, "Studies, Research, and Database Development," the first objective was to *initiate studies for the safe utilization of effective medicinal plant remedies for major human and livestock diseases.* Three activities were undertaken:

- *Complete an ethnomedical survey to explore utilization of traditional medicine practices for preventing HIV/AIDS* (achieved): The DDR prepared a training manual for traditional healers on preventing the spread of HIV, ethical practices in traditional medicine, and related policy issues.

- *Research on propagation and cultivation of plants used to treat human and livestock diseases* (achieved): Seven medicinal plants were identified for propagation and cultivation studies and provided to the Department of Biology (DOB) (one was provided by DDR, three by SOP, one by DDR and SOP, and two by FVM). Laboratory, glasshouse, nursery, and field studies have been undertaken on the reproductive biology and propagation of the plants. An additional 10 species were identified by SOP and FVM for further study. Progress was limited not only by the time required for such studies but by DOB's demand for exclusive rights to a project vehicle (which caused DOB to be released from its responsibility under the project).

- *Complete formulation studies (extraction, standardization, safety, efficacy, and dosage testing) of phytomedicines for three human and three livestock diseases* (partially achieved): The SOP completed preclinical trials for an antihelminthic drug and, with FVM, successfully completed clinical trials for human and animal tapeworm infections. SOP developed two antibacterial products for topical use against eczema, which have gone through preclinical trials using equipment provided by the project. Preclinical trials of remedies for bronchopneumonia and hypertension (human) and two livestock diseases (mastitis and dermatophilosis) are in the final stages. FVM, assisted by SOP, completed preclinical trials and developed and successfully tested dosages of an antihelminthic for canines. These activities have made the participating institutions aware that developing phytomedicines is a continuing exercise that requires a number of steps, each of which could require more time than originally envisaged (screening plant material, extraction, formulation, repeated preclinical trials, evaluation of preclinical data by a range of experts, development of an

ethical protocol, clearance of the protocol, clinical trials, monitoring of clinical trials, and approval of the drug for production). By engaging participants in this process, the project has built a foundation for further development of phytomedicines, including the definition of ethical and clinical protocols and processes for validating traditional medicines, which will enable SOP and DDR to undertake human clinical trials in the future. The two agencies have learned that collaboration is essential and must continue.

39. A second objective under Component 2 was to *assess the economic benefits at the national level of human and livestock healthcare based on indigenous medicinal plants and explore export potential.* The corresponding activity was to:

- *Develop methods to collect, analyze, and interpret quantitative data on socioeconomic benefits derived from medicinal plants used in human and animal healthcare on a national level* (achieved): An economic assessment was done of the benefits derived from medicinal plants used in human and livestock healthcare, and a socioeconomic survey was carried out (annexes 5 and 6 summarize the findings). The two studies provided timely estimates of the trade value of traditional medicines, which serve as an incentive for a number of government ministries and institutions (such as the Ministry of Agriculture, MOH, and the Environmental Protection Agency) to collaborate in the conservation, management, and sustainable use of medicinal plants. The economic assessment, which documented trade in raw medicinal plants at Ethiopian Birr (ETB) 423 million per annum (42 percent of the current expenditure on modern medicines), and estimated the value including services of healers and medicine at approximately 2 billion ETB, showed that Ethiopia has great potential to develop traditional medicine as a new source of growth and income, given adequate infrastructure and a fairly well-established and active private sector. The socioeconomic survey revealed a strong need to increase Ethiopia's medicinal plant stocks by cultivating priority species. Priority areas for supplying medicinal plants must also be identified, including BMNP and the lowlands in Bale and Hararghe Regions. The survey further concluded that the informal medicinal plant industry has created job opportunities for about 350,000 people and has the potential to be an alternative livelihood option for many more. Improved harvesting techniques and marketing facilities for medicinal plants (including storage, standards, packing, and quality parameters) are thus quite important to the national economy, supply and demand trends, and the sustainability of medicinal plants.

40. A third objective under Component 2 was to *develop a national medicinal plant database.*

- *Develop a national medicinal plant database* (achieved): A national, web-based database for medicinal plants was developed and installed at IBC and the National Herbarium (NH). Data on about 1,000 medicinal plants are available via internet, and the database offers an enhanced data exchange feature. Technical problems occasioned delays but the database was fully operational by the last six months of the project.

41. Under Component 3, "*In Situ* Conservation and Sustainable Use in Bale Mountains National Park," the corresponding objective was to *support in situ conservation and management and initiate ex situ cultivation of medicinal plants*. Five activities were undertaken:

- *An in-depth socioeconomic study of medicinal plant harvesting and use* (achieved): The study revealed that the major threats to conservation of medicinal plants, especially in BMNP, are not excessive or unsustainable harvesting but growing human and livestock populations and influx, harvesting of fuelwood and timber, clearing of forests for agriculture, and forest fires. A survey of traditional healers helped to identify 230 plant species of medicinal value. An in-depth biological survey, facilitated by AAU and completed after some delay, zoned areas by type and vegetation within the Bale Mountains. Vegetation in the BMNP and surrounding areas was broadly classified and documented. Information was gathered on biodiversity, including the diversity of medicinal plants and their ecological use in and around the Bale

Mountains. Threatened plants have been identified for plant propagation studies. Seven key vegetative areas were identified and zoned for sustainable harvest practices; within these areas, *in situ* conservation and *ex situ* cultivation are being done in three "hotspots" (Boditi, Goba, and Adele), where diversity is especially threatened.

- *Develop and implement appropriate management options and guidelines for the sustainable harvesting and use of medicinal plants* (achieved): In creating an enabling environment for the conservation and sustainable use of medicinal plants, the project helped lay the groundwork for further contributions to the government and GEF objectives of improving environmental protection and reducing poverty. A management plan for BMNP articulates a vision for developing and managing the area over the next 10 years. The plan, prepared by the Frankfurt Zoological Society (FZS) and PIU with from the Oromiya Bureau of Agriculture and Rural Development, is organized into five management programs. A logical framework approach was used to delineate the relationships between the plan's overarching goals and specific programs and activities. Each program has a long-term strategy that specifies the guiding principles and objectives that constitute the vision for the program; subobjectives and general actions outline the route and milestones by which that vision will be achieved. A three-year, detailed action plan has been developed for each management program.

- *Pilot trials for healers and farmers to grow selected threatened and indigenous species in nurseries and home gardens* (achieved): To date, more than 400 healer/farmers have been trained to propagate and cultivate medicinal plants. Two training manuals, for woody and herbaceous plants, were produced and a copy given to each trainee. This knowledge, which has been used to revive abandoned nurseries and establish new ones, has also been used effectively by healers to establish 331 home gardens for medicinal plants, which will provide information for the NMPD. To ease pressure on BMNP plant resources, traditional healers helped to collect threatened medicinal plants and grow seedlings in the nurseries, home gardens, buffer zones, and biodiversity hotspots. The five woreda nurseries have produced 1,986,881 seedlings, of which 1,857,850 were distributed throughout the five woredas and the remainder saved for later plantings. The project provided 2,887 farm tools and other home gardening equipment to healer/farmers and supplied other equipment to the six nurseries (five in the woredas and one in BMNP).

  To date, 407 traditional healers have been registered and 105 are waiting to be registered in the five woreda THAs. Traditional healers in Tigray, Amhara, and Oromia Regional States have formed associations and are now represented in the National Health Council of the Ethiopian Science and Technology Agency, which plays an advisory role in health matters. Two THAs were registered with the Bale and West Arsi Zonal Cooperative Departments and have opened bank accounts. The THAs ensured efficient communication between the PCMU and Agricultural Officers at the woreda level and the project focal staff. Women participated actively in the THAs as well as project activities. This process of organization and participation helped convince THA members that the conservation and sustainable use of medicinal plant resources offered healers an opportunity to derive more assured benefits from those resources.

  To reduce the pressure on BMNP resources and provide alternative sources of livelihood and income, several ecosystem-based interventions were piloted in three kebeles. Participatory rural appraisals (PRAs) helped to identify six livelihood options (beekeeping, dairy production, sheep and bull fattening, goat production, and butter trading), which provided new income opportunities for 233 individuals (140 men and 93 women). The women, who constituted 40 percent of the beneficiaries, had previously engaged mostly in fuelwood collection. To further ease the pressure on forest resources, 60 fuel-saving concrete stoves were distributed. To support these pilot activities, a revolving credit scheme based on group

collateral lending was established and implemented in collaboration with woreda/district offices.

- *Training park personnel to conserve, manage, and monitor medicinal plant resources within the park and adjacent forests* (achieved): 18 park staff and members of community-based organizations (CBOs) were trained. 2 park experts received training in geographical information systems (GIS), and 12 "hotspot" scouts were trained in ecosystem conservation and patrolling.
- *Implement education and mass awareness campaigns related to the conservation and management of medicinal plants and their importance to Ethiopia's biodiversity and long-term healthcare needs* (achieved, albeit delayed): Public education, mass awareness, and resource management manuals and programs were developed and available in Oromiffa and Amharic. Programs were disseminated through the Robei radio education center (in Oromiffa at the regional level) and Radio Fana (in Amharic at the national level). A five-day awareness-raising workshop focusing on conservation management was organized for 48 community members drawn from Bale Zone primary and secondary schools.

3.3 Efficiency

42. This analysis was not done at appraisal because the project was a LIL, in which the objectives and outputs were primarily institutional and the effectiveness and benefits were derived from the learning process.

3.4 Justification of Overall Outcome and Global Environment Outcome Rating

Rating: Satisfactory

43. Project implementation demonstrated the effectiveness of several strategies adopted under the IDA and GEF components in the following ways: (i) capacity building to manage development of phytomedicines; (ii) support to community-based development initiatives (pilot alternative livelihood schemes) to reduce pressure on medicinal plant resources; (iii) mass awareness program on conservation and sustainable use of medicinal plants; (iv) participation of local communities and associations in delivering project outputs (to ensure greater responsiveness and ownership); and (v) the effective use of NGOs to provide services (development of the management plan for BMNP) and ensure intensive contact with stakeholders. For more details on outcomes/outputs, see annex 2.

44. The project succeeded in laying the groundwork for new institutions and building capacity in others to further develop phytomedicines. Three research units (DDR, SOP, and FVM) now have the capacity to continue and complete preclinical drug validations. Guidelines for a human clinical trial process have been developed, along with protocols for specific trials. The project helped improve coordination among the various institutions (SOP and FVM; FVM and DDR), and the research units have the capacity to continue their work. Because the longer-term sustainability of this work depends heavily on strengthening administrative capacity in MOH to manage traditional medicines, a Traditional Medicine Unit was established in MOH. Clearly, however, this is a long-term effort, linked to broader developments in Ethiopia's overall healthcare framework.

45. The project has established medicinal plants as a special area of interest with the potential for offering concrete and immediate benefits for stakeholders. There is greater awareness of the potential benefits of conserving medicinal plants and using them more sustainably; there is a framework for conserving medicinal plants over the longer term; and the stronger research capabilities developed in DDR and SOP under the LIL have put Ethiopia in a position to begin developing its own phytopharmaceutical industry. A successful domestic industry could lead to major savings in foreign

exchange used in importing drugs and also increase the government's capacity to provide affordable drugs.

46. At the community level, the project helped:

- Increase local awareness of the importance of conserving medicinal plants.
- Provide alternative livelihood and income strategies, such as beekeeping, dairy and goat production, sheep and bull fattening, and butter trading.
- Enhance capacity to manage home gardens and nurseries for better conservation and income.
- Increase social mobilization and development of new THAs.
- Improve the supply of selected medicinal plants in nurseries and home gardens.
- Preserve knowledge of indigenous medicinal plants.
- Develop a generation of motivated leaders in traditional medicines.
- Reduce the harvesting of fuelwood.
- Enhance the commitment to participatory management of the BMNP.
- Contribute to longer-term conservation through community participation.

47. At the national level, the project has:

- Fostered national awareness of the importance of conserving medicinal plants.
- Increased skills in conservation and cultivation of medicinal plants.
- Established a national medicinal plant database and two FGBs.
- Improved technical capacity to manage biodiversity conservation.
- Confirmed the potential for marketable surplus of medicinal plants, including for export.

48. In October 2007, the United Nations Educational, Scientific and Cultural Organization (UNESCO) awarded an environmental preservation prize to IBC for establishing systems to ensure the conservation and sustainable use of Ethiopia's biodiversity, including its work to inventory and conserve medicinal plant, forest, and aquatic resources. IBC was recommended for the award by the Bureau of the International Coordinating Council of UNESCO's Man and the Biosphere Program.

3.5 Overarching Themes, Other Outcomes, and Impacts

(a) Poverty Impacts, Gender Aspects, and Social Development

49. The training, the awareness campaigns, and the home gardens increased demand for traditional healers' services, which improved their incomes. The training programs also motivated and involved women, with the result that many women who are traditional healers and farmers benefited from the project. Male farmers benefited as well. Members of different social groups were drawn into the community-based and other associations that formed to benefit from the credit program. Greater community participation also enhanced the commitment to longer-term conservation (especially the commitment to participatory management of the BMNP). See annex 5 (beneficiary survey results) for details.

(b) Institutional Change/Strengthening

50. Improved capacity within SOP and DDR to support the development of a national phytopharmaceutical industry has increased the potential for additional employment, income generation, and foreign exchange savings. Stronger capacity within FVM offers similar prospects for developing livestock phytomedicines.

(c) Other Unintended Outcomes and Impacts (positive or negative)

51. Because the project enabled traditional healers to gain recognition, organize into associations, and establish home gardens, there was a change in attitude among participating communities. Traditional healers are no longer seen as "root diggers." They can share their knowledge and work openly.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

52. Six interventions were identified as having potential to provide alternative sources of livelihood and reduce the dependence on forest products in the BMNP area: sheep and bull fattening, goat production, beekeeping, dairy production, and butter trading. These interventions were piloted. A survey that collected information on 175 beneficiaries of these activities found that the project's interventions had a positive impact on their livelihoods. Training was also offered in methods of establishing nurseries and home gardens and growing medicinal plants; participants regarded this training as beneficial for a number of reasons. See Annex 5 for complete results.

4. Assessment of Risk to Development Outcome and Global Environment Outcome

Rating: Moderate

53. The risk that the project's development outcomes will not be maintained is assessed as moderate, based on the following considerations.

- The project built a solid foundation for DDR , SOP, and FVM to continue research and perform studies on the extraction, standardization, safety, efficacy, dosage, formulation, and validation of phytomedicines. Capacity is also in place to finalize clinical trials and protocols, with the support of MOH and AAU.
- A foundation was established for healers to continue maintaining nurseries and home gardens and to expand membership in their associations when approved by kebele councils. Membership in alternative livelihood associations may also continue to grow, as new members wish to join.
- MOH has expressed its commitment to support (and regulate) traditional medicine through its newly established traditional medicine unit.
- As the country's economic base grows, research funding should increase, which will offer greater opportunities for collaborative research between units.
- The Oromiya Government is committed to developing and implementing the BMNP General Management Plan; a budget has already been submitted for this purpose.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: Moderately Satisfactory

54. The PDOs were clear, specific, and somewhat ambitious, yet they were firmly rooted in the institutional realities of Ethiopia and the sector at that time. The project addressed a serious environmental constraint (the threat to biodiversity of medicinal plants). The objectives were consistent with GEF's Operational Strategy for Biodiversity, World Conservation Union (IUCN) objectives, and the Ethiopian government's Conservation Strategy and Environmental Policy, which regards medicinal plants as important components of the nation's natural heritage. The project was designed to establish the basis for change (and the direction of change) during the initial period of a longer-term effort to conserve medicinal plants. There were provisions to further decentralize conservation at the woreda level, with a view to further, more local decentralization in the future. At the same time, the project was designed to

be consistent with the objectives of the 2000 CAS and specifically with the government's health sector strategy, especially its desire to integrate traditional with modern medicine, by gaining a clear understanding of the beneficial and harmful aspects of traditional plant-based medicines.

55. On a more specific level, the project was designed to close critical gaps in information, such as the lack of quantitative data on the potential economic benefits of developing medicines from indigenous plants; uncertainty over the precise location of "hotspots" where medicinal plant biodiversity was vanishing most rapidly; the lack of a structured database on national medicinal plants, including indigenous knowledge of these plants; and the lack of socioeconomic studies that could clarify the factors accelerating the loss of biodiversity. Without this essential information, efforts to develop and implement measures to deal with genetic erosion and promote the sustainable use of medicinal plants would have been held back for many years. The project drew on the experience of World Bank-supported projects; and on projects funded by the World Heath Organization, United Nations Development Programme, the GEF, the Netherlands, and the World Wildlife Fund (specifically, the Integrated Conservation and Development Project in the Bale Mountains); to make specific proposals for strengthening government measures in the project area, where open access to medicinal plants would soon eradicate any benefit gained from their increased use.

56. The project adopted and institutionalized a participatory approach to conservation, but it suffered delays because collaboration among the large group of stakeholders proved cumbersome. To compensate for the limited capacity for project implementation within Ethiopia, the project developed training programs that would help the lead institutions respond to the problems of field staff and farmers. Conditions for credit effectiveness and disbursement included the appointment of key staff and preparation of a work program for the first project year, including procurement, technical assistance, and training programs. Finally, the project was appraised by a team of highly qualified experts with strong practical experience in developing countries.

(b) Quality of Supervision
Rating: Satisfactory

57. The overall quality of World Bank supervision is rated satisfactory. The Bank carried out an average of two supervision missions per year (15 over the life of the project). It was responsive to the borrower's needs and built a solid partnership with the borrower. Consistent supervision, support, and technical assistance by the Bank helped overcome the operational challenges, turn the unsatisfactory ratings around, and gain a good assessment for the project during the MTR in March 2004. The action plan developed after the MTR helped to improve project performance and collaboration among the institutions. There was a high degree of continuity in task management: the same Task Team Leader and team of external consultants were in place from the beginning of implementation until the end of the project. This support helped the PCMU cope with a steep learning curve and was a positive influence on the operational, financial, and social aspects of project implementation.

(c) Justification of Rating for Overall Bank Performance
Rating: Satisfactory

58. The Bank's overall performance is rated satisfactory, based on its efforts to support and guide the Government of Ethiopia throughout the project and overcome the initially flawed ownership and management arrangements. The Bank made an extraordinary effort during and after the MTR to refocus the project, providing technical expertise on a wide-ranging set of topics covered by the project. The supervision was often intense, with regular on-site missions.

5.2 Borrower Performance

(a) Government Performance
Rating: Moderately Satisfactory

59. Government performance was moderately satisfactory, despite an initial lack of commitment and institutional ownership among Federal and Regional Government counterparts. At first the project was not seen as a government priority. It was regarded as a "small" project. Traditional medicine was not perceived as very relevant. No institution could champion traditional medicine, because no institution was in charge of traditional medicine. Constant changes in the Regional Offices meant that different focal persons met at different times. After the MTR, support increased at the federal and regional levels. With the appointment of Regional Coordinators, implementation picked up.

(b) Implementing Agency or Agencies Performance
Rating: Satisfactory

60. The implementing agency's performance is rated satisfactory. The IBC, the government-designated lead implementing agency, IBC signed MOUs with a dozen collaborating institutions to implement project objectives and established the PCMU. Staffing problems slowed implementation at first. The PCMU was not fully staffed, there was considerable turnover in key positions (Procurement Officer, Financial Manager), and the Project Coordinator, as well as the first Financial Manager and Procurement Specialist, lacked knowledge of Bank procedures. Disbursements lagged. There were problems in providing funds to field operations and to stakeholders, as well as problems in getting goods and equipment to the districts.

61. Project management improved considerably after a new General Manager was selected for IBC and the project hired a new Procurement Specialist, Financial Manager, and M&E expert. Together with the Project Coordinator, IBC and the newly staffed unit became key players in implementing the project. After training and familiarization with Bank procedures, the PCMU managed project activities transparently and collaboratively, building credibility that enabled the PCMU to lead implementation. Since the establishment of the PCMU as project executing agency, its role in preparing terms of reference, basic procurement documents, reports, presentations, and other outputs has been strong. Under the Oromia Bureau of Agriculture and Rural Development, five districts and the BMNP office in Bale Zone were involved in implementing project activities.

62. Establishment of the coordination offices sped implementation and compensated for the earlier delays. Coordinators were based in the field to interact with the focal points and healers, and accountants were put in the districts, which substantially improved the pace of disbursement and flow of funds.

(c) Justification of Rating for Overall Borrower Performance
Rating: Moderately satisfactory

63. Overall Borrower performance is rated moderately satisfactory based on the discussion in section 5.2. Following effective measures to improve project management, project activities yielded positive economic, ecological, social, and policy impacts.

6. LESSONS LEARNED

64. Sub-Saharan African (SSA) countries increasingly acknowledge the importance of traditional medicine and medicinal plants in healthcare, especially among poor and vulnerable members of society, yet little empirical evidence is available to support or reject this position. The LIL/GEF was developed in response to the Deputy Prime Minister's request to "fast track" a project that would give the government the quantitative background data needed to support action. Several lessons learned during the project are

instructive for future efforts to protect medicinal plant resources and support commercial production of phytomedicines.

Technical:

- Preclinical and human clinical trial protocols should be in place, and the appropriate agencies responsible for their clearances should be identified, at project implementation.

Project Specific:

- Too many implementing agencies and collaborating institutions can increase transaction costs and reduce the quality of implementation.
- Participatory assessments and planning of activities are critical in promoting ownership and subsequently mobilizing communities.
- Traditional healers in the Bale Mountain region are ready and willing to share their knowledge when project objectives are clearly defined and their intellectual property rights are protected.
- Focal champions at the stakeholder and beneficiary level who understand the project's objectives and activities help ensure successful implementation.

Institutional Framework:

- The basic infrastructure to complete validation studies should be in place, including technical protocols and guidelines, to ensure continuity of research.

Economic:

- The initial assessment undertaken through the project indicates that medicinal plants are a frequently hidden but sizable sector in the economy, one that is particularly important for poor people as suppliers/producers as well as consumers. More work is needed to understand the potential for commercialization through formal channels in parallel with providing incentives to conserve medicinal plants.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

65. Annex 7 includes the Borrower's retrospective assessment of the project, which the ICR team agrees. The borrower's assessment stresses the positive achievements of the project, and makes the following points:

- In the Borrower's opinion, the delay in implementation arose largely because of inadequate collaboration between institutions and the absence of a mechanism for adequately enforcing the MOUs. Nevertheless, the project's institutional objectives were met, though belatedly, particularly with respect to capacity building.

- The Borrower also cited high turnover of project staff as an institutional weakness that hampered effective monitoring of implementation. The lack of a baseline against which the impacts of subprojects could be measured reduced the scope for assessing project performance.

- The Borrower states that several kinds of delays affected implementation. Frequently there were long lag times between the identification of technical specifications for equipment and the provision of equipment to accomplish the desired task, especially to complete the validation of specific phytomedicines. The absence of procedures and guidelines for the validation and clearance of phytomedicines also slowed implementation, along with delays in carrying out the mass awareness program. The Borrower highlighted the lack of integrated information systems and key performance

indicators, capable of handling reliable data on a variety of project outputs, outcomes, and side effects, as a shortcoming that must be addressed in the future.

(b) Cofinanciers

N/A

(c) Other partners and stakeholders:

66. Annex 8 includes an assessment done by Dr.Tsige from the School of Pharmacy and Vice President of Research and Publication, AAU. The ICR team agrees with the partner's assessment.

- The project has contributed enormously to the formulation of protocols on ethical clearance by the Ethiopian Science and Technology Agency and clinical trials by the Drug Administration and Control Authority of Ethiopia. Such protocols had not existed for phytomedicines.

- The clinical trials on antihelminthic *G. lotoides* tablets, conducted at Tikur Anbessa Hospital on volunteer patients, indicated that the drug is safe. The project has also triggered the preparation of IPR guidelines on phytomedicines.

- The success recorded with phytomedicines will pave the way for others to be incorporated into Ethiopia's formal healthcare delivery system.

ANNEX 1. PROJECT COSTS AND FINANCING

(a) Project Cost by Component (in US$ million equivalent) – *This cost reflects the cancellations*

ET-Medicinal Plant Conserv LIL (FY01) - P052315 & GEF P035147			
Component	**Appraisal Estimate (US$ millions)**	**Actual/Latest Estimate (US$ millions)**	**Percentage of Appraisal**
INSTITUTIONAL STRENGTHENING, HUMAN RESOURCE DEVELOPMENT, AND PROJECT MONITORING AND EVALUATION	0.99	1.34	135%
STUDIES, RESEARCH, AND DATABASE DEVELOPMENT	1.72	1.37	80%
IN SITU CONSERVATION AND SUSTAINABLE USE OF MEDICINAL PLANTS IN BALE AREA	1.76	0.48	27%
Total Baseline Cost	**4.47**	**3.19**	**71%**
Physical Contingencies	0.37	0.00	0%
Price Contingencies	0.25	0.00	0%
Total Project Costs	**5.09**	**3.19**	**63%**
PPF	0.00	0.03	0%
Front-end Fee IBRD	**0.00**		
Total Financing Required	**5.09**	**3.22**	**63%**

(b) Financing

P052315 LIL (FY01) & GEF P035147- ET-Medicinal Plant Conserv				
Source of Funds	**Type of Financing**	**Appraisal Estimate (US$ millions)**	**Actual/Latest Estimate (US$ millions)**	**Percentage of Appraisal**
Borrower		**0.78**	**0.56**	**72%**
International Development Association (IDA)		**2.51**	**1.81**	**72%**
Global Environment Facility (GEF)		**1.80**	**0.85**	**47%**

ANNEX 2. OUTPUTS BY COMPONENT

Annex table 2.1: Summary of key outputs by component

Key outputs (as per the PAD) by component	Output indicators (as per the PAD)	Latest estimates/actual
Component 1. Institutional Strengthening, Human Resource Development, and Project Monitoring and Evaluation		
1.1 PMU fully operational and project monitoring and evaluation system developed and implemented	PMU fully operational by end of PY1 M&E system operational by end of PY1	PMU was fully operational by PY1 with 9 staff. M&E manual was developed in PY1 and operational by PY2.
1.2 IBCR, DDR, AAU (SOP FVM NH and DOB) ESTC and THA capacity for implementing project activities strengthened and institutional collaboration established	Institutional assessment conducted and training needs identified by end of PY1 Training completed by end of PY 2 Professional assessment of status after training by end of PY4	Institutional assessment was conducted and training needs identified by end of PY1. Overseas short-term training and study tours were initiated in PY2 and completed by PY5 (37 staff of stakeholder institutions were trained). Professional assessment of status after training was done by end of PY3, and the conclusion was that the training was very important for the implementing institutions to undertake their tasks. Additional training was recommended. Therefore a new training plan was prepared and implemented.
1.3 THA organized workshop and established FGB for medicinal plants.	Workshop in PY1 and FGB in PY2	THA workshop was organized in PY1 (total of 5 workshops until PY4) and FGB has been established in PY2.
Component 2. Studies, Research, and Database Development		
2.1 Assessment conducted and reports prepared on current levels of use, national dependence on, and economic benefits derived from medicinal plants	Assessment completed by end of PY1	Market survey of medicinal plants was initiated in PY4 and completed in PY5.
2.2 Ethnomedical survey to explore utilization of medicinal plants and traditional healthcare practices for prevention of HIV and mitigation of adverse impact of AIDS	Survey completed by end of PY3	Ethnomedical survey on medicinal plants collected by traditional healers for treatment of opportunistic diseases was conducted in PY2; based on the survey, antiviral and antifungal as well as toxicity studies were conducted on some prescribed traditional medicines.
2.3 National medicinal plants database established, identifying and documenting all plants commonly used to control 3 major human diseases and 3	Number of plants identified for the 3 human diseases by PY1; and database developed in PY3 Number of plants	About 8 medicinal plants (for the study on 3 human diseases) and about 11 medicinal plants (for the study on 3 animal diseases) were identified in PY1 & 2. Medicinal plants database established and

Key outputs (as per the PAD) by component	Output indicators (as per the PAD)	Latest estimates/actual
livestock diseases (including medicinal plants identified from a biological survey in BMNP).	identified for the 3 livestock diseases by PY1 and database developed by PY3 Medicinal plants identified in Bale Mountains entered into national database by PY3	tested in PY4 is operational. About 1,000 medicinal plants identified in Bale and other areas were entered in the national database in PY4.
2.4 Safety, efficacy, dosage, and formulation determined for commonly used herbal remedies for 3 human and 3 livestock diseases	Formulation studies completed by end of PY4	Formulation study was initiated in PY2 and completed for 1 human and 1 animal disease in PY5. Phytomedicine study for 1 animal disease was dropped following the MTR because preliminary results were not encouraging. The remaining studies for 1 animal and 2 human diseases are at preclinical stage.
2.5 Propagation and cultivation methods for selected medicinal plants developed	Methodologies prepared by end of PY4	The study on propagation and cultivation of medicinal plants was dropped following the MTR as it should be done only after the safety and efficacy of the plants is proved (formulation study completed).
Component 3. In Situ Conservation and Sustainable Use in Bale Mountains Area		
3.1 On-site management, including detailed socioeconomic and biological surveys and zoning conducted in Bale Mountains area	Surveys completed by end of PY2 Changes in community participation with BMNP staff	Socioeconomic and biological surveys were completed in PY4, after substantial delay. Informal surveys indicated that currently there is better community participation and collaboration with BMNP staff.
3.2 Guidelines for sustainable management and harvesting of threatened and rare medicinal plants from Bale Mountains and surrounding forests developed	Guidelines developed by PY3 and implemented by end of PY4	The guidelines were drafted in PY3. However, the socioeconomic survey revealed that the major threat to medicinal plants was not overharvesting but other factors, including human and livestock population growth and influx, fuelwood and timber harvesting, forest clearing for agriculture, and forest fires, which required ecosystem-based and holistic interventions. The development of harvesting guidelines was abandoned, and an ecosystem-based conservation strategy was pursued and piloted in 3 kebeles.
3.3 Impact of harvesting guidelines and management interventions monitored and evaluated	Monitoring and evaluation initiated by PY5 Impact of harvesting reduced	As noted in 3.2, the harvesting guideline was not developed, but M&E of the impact of project interventions (in situ and ex situ) in Bale was completed in July 2007.
3.4 *Ex situ* pilot cultivation trials of threatened and rare medicinal plants initiated	Number of pilot cultivation trials initiated by end of PY4, including number of people engaged	Six medicinal plant nurseries have been established/managed since PY2; by the end of PY5, 331 medicinal plant home gardens were established and managed by 331 traditional healers/farmers. Moreover, 3 medicinal plant

Key outputs (as per the PAD) by component	Output indicators (as per the PAD)	Latest estimates/actual
		demonstration sites were established and managed by PY3. One medicinal plant FGB was established in PY4 and more than 200 medicinal plants conserved in it.
3.5 Training conducted for park staff, rangers, and local communities	Training programs implemented by PY3; change in number of trained park staff	Overseas study tours were organized for park warden in PY3 and for park and woreda experts in PY5. Four local trainings were provided and 5 awareness-raising workshops conducted for local communities and staff (including traditional healers, woreda experts, focal persons, development agents, and nursery staff). Additional training of two park experts was completed by the end of December 2006.
3.6 Mass awareness campaign developed	Pilot programs developed by PY2; a number of awareness programs undertaken	A public education program was developed and initiated in PY4 after substantial delay. Three radio programs were developed in national and local languages (Amharic and Oromiffa) and transmitted through national and local media. A half-day panel discussion involving higher authorities was televised. A community conservation education manual was prepared and provided in five sessions targeting traditional healers, nature clubs, farmers, and vanguard groups.

ANNEX 3. ECONOMIC AND FINANCIAL ANALYSIS

(including assumptions in the analysis)

N/A

ANNEX 4. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION PROCESSES

(a) Task Team Members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Shiv Singh	Sr. Agronomist	AFTA2	Team Leader
John D. H. Lambert	Consultant	AFTEN	Medicinal Plants Specialist
Supervision/ICR			
Almaz Teklesenbet	Program Assistant	AFTAR	Task Team Member
Amdemariam Yohannes	Consultant	AFTS2	M&E
Assaye Legesse	Sr. Agricultural Economist	AFTAR	Operations
Berhanne Manna	Sr. Agriculturist	AFTAR	Team Leader
Eshetu Yimer	Sr. Financial Management Specialist	AFTFM	Financial Management/Disbursement
John D. H. Lambert	Consultant	AFTEN	Medicinal Plants Specialist
Liba C. Strengerowski-Feldblyum	Operations Analyst	AFTEN	TTL/ICR
Michael Broemmel	Consultant	AFTRL	Institutional M&E
Rahel Lulu	Program Assistant	AFCE3	Supervision Support
Samuel Haile Selassie	Sr. Procurement Specialist	AFTPC	Procurement

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	US$ 000s (including travel and consultant costs)
Lending		
FY98	0	70.20
FY99	0	118.63
FY00	8	55.69
FY01	3	18.80
FY02	7	7.41
FY03	7	12.18
Total:	25	282.91
Supervision/ICR		
FY00	4	4.41
FY01	11	15.73
FY02	15	64.48
FY03	9	33.66
FY04	19	97.40
FY05	9	50.00
FY06	6	45.38
FY07	0	1.64
FY08	2	9.11
Total:	75	321.81

ANNEX 5. BENEFICIARY SURVEY RESULTS

An ecosystem-based intervention to provide alternative sources of livelihood, decrease the pressure on BMNP, and improve incomes was piloted among selected households. Three kebeles/park-associated communities, each in a different woreda, were identified for the pilots, based on their proximity to BMNP and their effect (positive and negative) on the park: Ittitu Sura (Goba woreda), Waberu (Delomena woreda), and Gofingira (Dinsho woreda). Based on PRAs conducted by BMNP experts (an ecologist and sociologist), each woreda project focal person, and the Bale Zone project coordinator, six alternative livelihood options (beekeeping, dairy production, sheep and bull fattening, goat production, and butter trading) were identified. Prospective beneficiaries were selected, based on economic status. Low economic levels and limited possession of factors of production (physical assets, land, and money) were taken into consideration, as well as women's livelihood strategies and the level of dependence on marketing forest products.

Prior to the livelihood interventions, a baseline survey was conducted in which a checklist was used to collect information on about 175 prospective beneficiaries. The checklist covered such variables as sex, age, family size, wealth status (poor, medium, high), sources of income (crop and livestock production, sales of forest products, and other activities) and practices that reduced BMNP biodiversity (free grazing, forest clearing for farm expansion, and forest products trading). The baseline survey made it possible to identify any changes in socioeconomic conditions and forest products trading following the livelihood interventions.

Baseline survey results on forest products trading

In Delomena woreda, goat production beneficiaries traded an average of 296.6 donkey loads of forest products per year for an average income of ETB 2,585.60. Bull fattening and beekeeping beneficiaries traded an average of 86.4 and 274.11 donkey loads of forest products per year, earning ETB 840 and 2,741.05, respectively.

In Goba woreda, dairy production and beekeeping beneficiaries traded an average of 90.95 and 83.6 donkey loads of forest products per year and earned an average of ETB 999.47 and 609.8, respectively.

In Dinsho woreda, sheep fattening, butter trading, and beekeeping beneficiaries traded an average of 76.8, 93.89, and 67.2 donkey loads of forest products per year, earning an average of ETB 780, 938.67, and 528, respectively.

Sales of forest products accounted for 46 percent of yearly income for beneficiaries in Delomena, 61 percent in Goba, and 25 percent in Dinsho.

Livelihood alternatives and resources, by woreda

Annex table 5.1 presents information on beneficiaries and resources provided to each woreda by livelihood option.

Activities and benefits identified by healers

After it became clear that medicinal plants were not overharvested, the next step was to develop manuals for propagating and cultivating woody and herbaceous medicinal plants. The PC concluded an agreement with Sinana Agricultural Research Center, Horticultural Research Division, to develop two manuals and train healers to establish woreda nurseries and their own home gardens. The manuals were printed by the project and each trainee received a copy. The overall purpose of the manuals and training was to provide technical knowledge to enable traditional healers, medicinal plant growers, development workers, and

related professionals to cultivate woody and herbaceous medical plants and minimize the need to harvest them from the forest. To meet the needs of participants, the course was conducted in Afaan oromo with instructional aids in English and Afaan oromo.

Livelihood beneficiaries by woreda

Livelihood options by woreda	Beneficiaries		Total	Status of implementation
	Male	Female		
Goba Woreda				3 beehives each, 100%
Beekeeping	22	8	30	
Dairy production	3	17	20	1 cow each, 100%
Subtotal	**25**	**25**	**50**	
Dinsho Woreda				
Sheep fattening	20	0	20	5 sheep each, 100%
Beekeeping	30	0	30	3 beehives each, 100%
Butter trading	0	19	19	ETB 1,000 each, 100%
Subtotal	**50**	**19**	**69**	
Delomena Woreda				
Beekeeping	30	0	30	2 beehives each, 100%
Bull fattening	35	0	35	1 bull each, 100%
Goat production	1	48	49	2 goats each, 100%
Subtotal	**66**	**48**	**114**	
Total	**141**	**92**	**233**	

Techniques of propagation and cultivation included:

- Seed collection methods
- Seed drying
- Seed processing
- Seed storage
- Establishing a nursery
- Nursery bed preparation
- Seedbeds
- Methods and times of planting
- Causes of plant stress and failure to germinate
- Seedling protection
- Light, temperature, water, and nutrient stress
- Disease and pest attack
- Nursery management
- Vegetative propagation
- Transplanting and field management
- Mulching and weed control

The successful use of the manuals indicates that they have value for training traditional healers in other regions in basic, relatively uniform principles of medicinal plant propagation and cultivation. Future costs should be in translation and publication in the local language.

More than 400 healers received five days of training. By the time the project ended, many more healers were requesting training. The concepts that healers could play an important role in medicinal plant conservation and management and that home gardens meant healers do not have to travel so frequently or far to the forest were clearly understood and appreciated.

Farm Africa requested information on the five woreda THAs and will seek their assistance in providing seedlings for transplanting in degraded areas in seven other woredas that affect BMNP resources. Again, the benefits of the project can be seen and should be supported by the central and regional governments.

Beneficiaries' opinions on socioeconomic benefits and impacts

Development interventions in any sector and of almost any type occur in a social context and thus have social implications and impacts. The sustainability of any project depends on the extent to which it addresses people's needs and expectations. The medicinal plant project had a considerable social dimension, because it was directed at traditional healers, who provide health services to most people and animals in Ethiopia. The project's social impacts can be summarized as follows:

- Traditional healing was formerly a hidden practice, but most people interviewed believed that healers now offer services openly, without fear, because they are organized, because the mass awareness campaign emphasized their important role in healthcare, and because of the resulting prestige and recognition they are given as important community members.
- Because the project raised awareness of the value of traditional healthcare, the transfer of traditional knowledge from parents to children and other family members is widely exercised. It was not so commonly shared before. The Bale Mountain healers openly expressed the need to be less secretive with their knowledge.
- The THAs are considered bona fide organizations. They are supported and recognized by the woreda line offices, institutions, and communities.
- THAs from neighboring woredas have initiated discussions and exchanged information on the availability and collection of threatened medicinal plants.
- As witnessed by the traditional healers themselves, their actions (in forming associations and establishing home gardens) and the recognition given to them by the project have changed attitudes within the communities and increased demand for their services.
- The project motivated and involved women in training and other activities, benefiting many female healers and poor women farmers. For instance, 74 livelihood beneficiaries and 48 THA members are women, who control and manage the livelihood credit and who participate in their associations on the executive committee or as active members.
- The provision of livelihood inputs through revolving credit schemes offering group loans had social implications because the groups that were formed to obtained loans (CBOs and other associations) included members of different social groups.
- As the project was participatory and to the satisfaction of the community, no negative social impact has yet been observed.

To give an idea of social impacts on a more individual level, a traditional healer from Goba woreda, when asked how he had benefited from the project, said that with the propagation and cultivation training he was able to established a home garden with more than 100 types of medicinal plant, which allowed him to open a pharmacy in his home. He viewed this as an improvement in his life that would make his business more profitable.

Sheik Abdurahim Abdi, treasurer of the Goba THA, commented that "before, we were considered as root diggers, but now, we are able to exercise openly and without fear." Another traditional healer said, "Before, our knowledge was limited to an individual in a family, but today, we are able to transfer and share our knowledge to our children and family members."

ANNEX 6. STAKEHOLDER WORKSHOP REPORT AND RESULTS

Two workshops were undertaken: a workshop to review results of the Economic Benefit Study and a workshop on the General Management Plan for BMNP. Each is described in the sections that follow.

Workshop on the Economic Benefit Study

An economic assessment of the potential benefits from using medicinal plants in human and livestock healthcare, in conjunction with the results of a socioeconomic survey, concludes that the estimated trade value of traditional medicine is ETB 2 billion and indicates that trade in raw medicinal plants has an estimated value of ETB 423 million per annum, or 42 percent of current expenditures on modern medicine (annex table 6.1).

Seventy percent of Ethiopians are thought to use traditional medicines. In rural areas, this number may exceed *90 percent*. The Ethiopian government and people have benefited from readily accessible and affordable plant-based medicines, but plant supplies are declining throughout the country (although at an unknown rate). Should this decline continue, the government could face enormous costs in replacing traditional plant-based medicines with modern drugs. For example, *if 50 percent of the 515 million traditional treatments* are replaced by modern drugs at a cost of *ETB 20* per treatment, the government will need to find an additional *ETB 5 billion—an additional 20 percent of its current budget—*to substitute for the traditional medicinal plants.

Value added to Ethiopia's economy by the trade in medicinal plants (est. 2005) *values in ETB*

Value of plants traded	316,944,871
Value of plants used but not marketed	106,125,000
Total value of plant material traded and used	423,069,871
Value of traditional healing services	1,632,414,448
Total value added to the economy	2,055,484,319

The value of the trade to the economy and Ethiopian people is a result of the large and active demand for traditional medicines. An estimated 350,000 people have a role in the medicinal plant trade, including harvesters, traders, and healers. Based on the market survey, it is estimated that 48 million consumers use some 56,000 tons of medicinal plants each year. Consumers obtain their plant-based medicines from healers or traders or harvest the plants themselves. Some 87 percent (49,000 tons) are harvested from wild sources; only 7,000 tons are cultivated.

Workshop on General Management Plan for BMNP

A study concluded that the major threat to biodiversity in BNMP, including medicinal plants, was not overharvesting but rather human and livestock population growth and influx, fuelwood and timber harvesting, forest clearing for agriculture, and forest fires. In light of this information, the project, in consultation with the Oromiya Bureau of Agriculture and Rural Development and the Frankfurt Zoological Society (FZS), developed a management plan for BNMP. The resulting General Management Plan (GMP) for the Bale Mountains National Park (BMNP) lays out a vision for developing and managing the park over the next 10 years and outlines specific actions to move towards this vision in the next three years.

The GMP was developed using a participatory process that made used of background information, a problems and issues analysis conducted by park staff, a stakeholder workshop, and community consultations. The planning process aimed to ensure that park stakeholders had an opportunity to contribute to the issues and problems addressed in the GMP and suggest solutions. It is hoped that improved ownership and commitment to implementing the GMP will result.

The GMP is organized into five management programs, using a logical framework approach to group common topics and align them with park management responsibilities wherever possible. Each program has a long-term strategy in which guiding principles and objectives provide the vision for the program and specific objectives and general actions outline the route and milestones for achieving the principles and objectives. For each program, a practical, management-oriented, three-year action plan lists the detailed actions and activities that will help to achieve the vision in the near term. This plan is designed to be regularly rolled forward every three years during the implementation of the GMP, so that actions and activities are assessed and refreshed in light of achievements and developments. The GMP is designed to be dynamic, flexible, and adaptive to changing management needs and priorities as well as the local sociopolitical context. BMNP annual operations plans should be developed through close consultation with the GMP and these three-year action plans.

Park purpose, significance, and value. The Bale Mountains of Ethiopia, within the National Regional State of Oromia in southeastern Ethiopia, is the most important conservation area in the Ethiopian highlands and is of international significance. The area is one of 34 International Conservation International Biodiversity Hotspots and qualifies for World Heritage Site and Biosphere Reserve Listing. The biodiversity within the BNMP, which occupies about 2,200 square kilometers at the core of the Bale Mountains, is of critical ecological, cultural, and economic importance. The purpose of the BMNP is to "conserve the ecological and hydrological systems of the Bale Mountains, including the Afroalpine and montane forest habitats with their rare, diverse, and endemic species, while contributing to the social and economic wellbeing of the present and future generations of people locally in Ethiopia and in the wider region."

The most important Exceptional Resource Values (ERVs), which together give the park its global significance, are the rare, endemic, and endangered species, which are found across all taxa and habitat types, and the hydrological system, which provides water and thus economic benefits to 12 million downstream users. Other areas with particular local, national, and international significance include: the Afroalpine plateau, the largest area of this habitat type on earth; the Harenna forest, the second largest moist tropical forest in Ethiopia, and the distinct altitudinal zones of BMNP, with stands of giant *Erica* and bamboo, along with different forest types. The park also provides substantial socioeconomic and cultural benefits to local communities and to others (nationally and internationally), through the use of natural resources such as coffee, timber, grazing, and nontimber forest products, as well as limited tourism.

Principles of the GMP. Four principles are fundamental to the management of BMNP and guide the implementation of the GMP:

1. Conservation of the ERVs takes precedence in all actions.
2. Partnerships with stakeholders, particularly park-associated communities, are a key component of GMP implementation.
3. The environmental and sociocultural impact of development and park users will be minimized.
4. Management systems will be responsive and adaptive to changing circumstances and knowledge.

Zoning scheme. Although the conservation of biodiversity and ecosystem processes is the primary management objective throughout BMNP, irrespective of zone, a management zoning scheme was introduced for the GMP to deal with current realities in BMNP and secure the park's ERVs. The zoning scheme provides a framework for protecting the park that reconciles the need to protect its natural resources with the need for communities and tourists to use them. Two zones, with associated prescriptions, have been designated: a Conservation Zone and a Conservation and Sustainable Natural Resource Management Zone. The GMP depicts the proposed zone boundaries, but these will be finalized as part of implementation.

The Conservation Zone, which covers just over 50 percent of BMNP, comprises areas with relatively little permanent settlement that are high in biodiversity and important for the conservation of the ecosystem's Principal Ecosystem Components (under the Ecological Management Program), such as wetlands, forests, or important habitat for Ethiopian wolves and mountain nyala. Within this zone, no consumptive or damaging use is permitted, no settlement is allowed, and any development must meet very strict environmental impact guidelines set by management. Tourists and local people are allowed to access sites of natural, scenic, economic, or cultural significance, however.

In the Conservation and Sustainable Natural Resource Management Zone, sustainable use of natural resources will be allowed under negotiated management agreements between rightful users and BMNP management, under the Sustainable Natural Resource Management (SNRM) Program. Settlement, infrastructure development, and cultivation are allowed only within these SNRM agreements between Resource Management Groups and BMNP and must meet environmental impact prescriptions.

Implementation of the zoning scheme involves voluntary resettlement of current residents of the Conservation Zone. Actions to determine those with tenure rights and implement zoning are outlined in the SNRM Program.

Management programs. As mentioned, the GMP has five management programs:

1. Ecological Management Program
2. Sustainable Natural Resource Management Program
3. Tourism Provision and Management Program
4. Park Operations Program
5. Outreach Program

GMP monitoring and evaluation. The GMP monitoring plan is a key component of adaptive management, in addition to assessing whether the GMP has been implemented successfully. A multitiered framework of indicators has been developed to conduct M&E at several different levels: from park purpose (ecological monitoring plan), through threats and program purposes and objectives (impact monitoring), to actions and activities (implementation monitoring). The framework draws on best practices and is integrated with the GEF Protected Area Systems Project, which commenced in Ethiopia in 2007, by using a World Bank/World Wildlife Fund Management Effectiveness Tracking Tool.

ANNEX 7. SUMMARY OF BORROWER'S ICR AND/OR COMMENTS ON DRAFT ICR

Borrower's ICR for the IDA Credit: Learning and Innovation Lending (LIL)

The Conservation and Sustainable Use of Medicinal Plants Project (CSMPP) was developed and implemented by the IBC in collaboration with stakeholders. The specific objectives of the project's credit component were to support the establishment of FGBs for medicinal plants, strengthen the capacity of traditional healers, develop an IPR policy guideline, develop five phytomedicines for human and livestock diseases, establish a national medicinal plant database, develop techniques for propagating medicinal plants, and carry out a national economic survey on the use of medicinal plants. The IBC was designated in a government-signed MOU as the project's lead implementing agency, to work with 12 collaborating institutions. IBC established a Project Monitoring and Coordination Unit (PCMU) to facilitate implementation.

The project's credit component was financed by IDA with a matching fund allotted by the Government of Ethiopia. The project was originally to last four years, but a six-month extension was granted to complete a validation study for one phytomedicine. The original allocation of IDA was US$ 2.5 million, but about US$ 600,000 dollars were cancelled.

Based on the its objectives and key performance indicators (KPIs), the project's achievements can be summarized as follows:

- An M&E system manual, reviewed and approved by IDA, was developed and used.
- A national consultant conducted an institutional and human resource capacity assessment to identify training needs and other inputs. Based on the results, training and procurement plans were prepared and implemented.
- THAs conducted a number of workshops to raise members' awareness of the importance of conserving medicinal plants, validating traditional medicines, following a code of ethics and practices, and other issues. This activity made it possible to organize THAs in other areas, such as Tigray and Amhara.
- A medicinal plant FGB was established at Wendo Genet and maintains more than 265 medicinal plant species, of which 180 are taxonomically identified. The collection includes plants identified for treatment of three human and two livestock diseases. Traditional healers contributed to the identification and collection of frequently used and threatened medicinal plants conserved in the FGB. Posters depicting ex situ conserved plants at Wendo Genet were printed for public awareness.
- A Model Knowledge Transfer Agreement (KTA) was developed to address intellectual property claims on the use and transfer of traditional medicine. The Model Agreement is in accord with the proclamation on Access to Genetic Resources and Community Knowledge and Benefit Sharing ratified by Ethiopia's Parliament in February 2006. Regulations and guidelines to implement the proclamation are expected to be drafted by the IBC.
- A market survey of medicinal plants conducted in selected urban and rural areas quantified the estimated value of traditional medicine used annually and specified the types of plants used most frequently. Trade in raw medicinal plants was estimated at about 42 percent of current expenditures on modern medicines.
- DDR conducted an ethnomedical survey to explore the use of medicinal plants and traditional medical practices in preventing and treating opportunistic diseases arising in conjunction with HIV/AIDS. The survey showed that traditional healer-practitioners use single medicinal plants or a mixture of various materials to treat opportunistic diseases. DDR entered into an agreement with five traditional practitioners to validate the safety and efficacy of the drugs they administer. Preliminary results showed some of the drugs to be effective against fungal and bacterial

infections. Further studies are needed to investigate toxicity effects and conclude an overall safety and quality assessment (which were not within the scope of the project).

- The FVM collected, documented, and analyzed ethnoveterinary medical practices, agents, and procedures in various parts of the country to help in further validation efforts.
- A National Medicinal Plants Database was developed, making it possible to enter diverse categories of information (for example. taxonomic, pharmacological, agronomic, and other kinds of data). This system makes it possible to categorize data and disseminate it for use by different target groups, such as research and learning institutions.
- The NH collected information on more than 800 medicinal plants from the field survey, herbarium specimens held at AAU, and the literature. Data on medicinal plants identified in BMNP were entered into the database, including the plants identified as treating human and livestock diseases.
- The formulation of two phytomedicines for human and animal tapeworm infections was finalized by SOP. The phytomedicine developed for animals (based on *G. lotoides*) was tested by FVM repeatedly on dogs, using different doses, and in clinical studies a single dose proved to reduce 93 percent of worms. The efficacy of this phytomedicine is comparable to that of conventional drugs available in the market, if not better. Some of the research results were published in peer-reviewed international journals.
- For the human clinical trials, a number of steps had to be taken to acquire ethical and clinical protocol clearances from the National Health Council and the Drug Administration and Control Authority (DACA). These protocols have been cleared. Recently DACA authorized the first clinical trial to evaluate the use of a phytomedicine (based on *G. lotoides*) in humans infected with tapeworm. Results are pending.
- Preclinical studies of two medicinal plants used to treat hypertension and respiratory problems were close to completion when the project ended. DDR added two optional medicinal plants that are equally effective for treatment of hypertension; preclinical studies were completed, except for the toxicity tests.
- FVM screened for medicinal plants that are effective in treating cow mastitis. Data from preliminary in vivo trials of one traditional preparation of the medicine indicated an effectiveness of about 80 percent, but standardization and dosage formulation remain to be studied. Based on a survey in Omo Region to assess pastoralists' use of other medicinal plants for mastitis, five additional plants were identified as effective.
- Propagation studies of the medicinal plants identified to treat human and livestock diseases were initiated and results expected in the project's final year, but issues of sequencing and timing caused these studies to be dropped after the 2004 MTR. (The final list of plants for propagation studies could not be determined until safety and efficacy studies were concluded, which would not occur until the end of the project period.)

In addition to the above-listed output indicators, the project has achieved other results, which were not part of its original objectives:

- The project created a collaborative environment and won the confidence of traditional health practitioners.
- Preclinical studies of two medicinal plants were undertaken by SOP for treatment of skin diseases associated with HIV infections. One appeared to be promising enough for human clinical trials.
- DDR drafted a regulation for the Administration of Traditional Medicine and Control, and MOH finalized the document in line with its mandate for implementation. This intervention should help organize and manage traditional medicine and associated practices in a sustainable manner.
- DDR prepared a module, eventually published as a manual, to train traditional healers about the importance of a code of ethics and practices in traditional medicine, ways of HIV infection, policy frameworks for traditional medicine, and other topics.

The Project encountered a number of challenges during implementation, but important lessons were drawn from the learning component:

- The large number of institutions involved in the project, along with its ambitious design, presented difficulties in coordination and meeting the targets.
- Although IBC was delegated to lead the implementation, it lacked the mandate and capacity to oversee the validation component, which complicated M&E.
- No clear procedures or established system existed for validating phytomedicines. Guidelines, such as those for developing ethical and clinical protocols, and clearance procedures were lacking, and the capacity to develop them was limited. The validation of traditional medicines involves repeated experiments over long periods before reliable results can be obtained, so the time frame was unrealistic.
- The KPIs developed to monitor project performance were overambitious. Many were difficult to produce because they depended on the outcomes of research. For example, the validation process was not clearly defined until very late in project implementation.
- The IBC/PCMU was not familiar with Bank procedures when the project began. Awareness of procurement guideline was limited, which contributed to further delay.
- The Project should have given priority to documenting the knowledge and practice of traditional medicine, which is disappearing fast. The whole range of validation studies could have been developed and implemented later, phase by phase, with a limited number of stakeholders each time, to meet project requirements.
- Despite such limitations, the project eventually improved the capacity of implementing institutions, including IBC, the lead agency, to strengthen the conservation of medicinal plant genetic resources and develop phytomedicines by providing laboratory equipment, short-term study tours, and other kinds of training. The new technical and material capacity, including the knowledge acquired on how to develop phytomedicines, will enable stakeholders to pursue the remaining activities and undertake similar studies in the future.
- Sustainability is also likely for project-initiated activities that fall within the mandates of stakeholder institutions. For example, ex situ conservation of medicinal plants in FGBs, phytomedicine development, database management, and legal protection for communities' indigenous knowledge will become part of the programs of several institutions. The new Traditional Medicine Unit at MOH should help ensure the sector's development and sustainability.
- Registration of traditional health practitioners and regulation of their practices is also imperative to safeguard the public from unethical practices and promote the beneficial aspects of traditional medicine. The development of standards and control mechanisms for traditional medicine will be the basis for future interventions.
- In conclusion, the learning pilot project proved that traditional medicine could contribute to improved healthcare services and serve as a means for additional income generation for all involved in collecting, cultivating, trading, and processing medicinal plants, and as well as for the practitioners of traditional medicine. A focused program on traditional medicine should be launched at the national level to capture the knowledge available in various parts of Ethiopia and to conserve the genetic resources on which traditional medicine depends.

Borrower's ICR for the GEF Grant

In October 2001, IBC and other stakeholders began to implement the Conservation and Sustainable Use of Medicinal Plants Project in five districts/woredas (Delo-Menna, Goba, Dinsho, Adaba, and Dodola) in and around BMNP. The project's specific objectives with respect to conservation were to: support in situ conservation and management of medicinal plant diversity and initiate ex situ cultivation of medicinal plants; initiate pilot trials with farmers to grow selected threatened species on land already available, including home gardens and national park boundary and buffer zones; train national park staff and local

communities; and improve public awareness of the relevance of conservation and management of medicinal plants for Ethiopia's biodiversity and long-term healthcare needs. The Project was cofinanced by IDA on a credit basis and by the GEF grant, with matching funds from the Government of Ethiopia. As indicated in the project appraisal document, the GEF grant totaled US$ 1,802,000 and was earmarked to cover the costs of education and mass awareness campaigns, local training, and the pilot farmer-based trials.

In situ conservation efforts included development of the GMP for BMNP, described in annex 6. Two workshops, community consultations, and a number of other consultation meetings were organized to review the GMP. At a more local level, a socioeconomic survey and survey of flora helped to identify three micro-hotspots for biodiversity. A management guideline to conserve these hotspots was prepared, and a consultative workshop was organized. Based on the workshop recommendations, management interventions are being implemented in the Adelle and Boditi hills hotspots by BMNP and in the Goba forest hotspot by Goba ARDO. About 12,400 seedlings of *Juniperus* species have been planted in the buffer zones of the Boditi hotspot. The micro-hotspots are patrolled by 12 forest guards, employed for that purpose. A total of 9 kilometers of road was maintained so that vehicles could access the area for patrolling and management.

As part of its ex situ conservation component, the project established the first FGB for medicinal plants in Goba in August 2004. The FGB is staffed with one agronomist, three guards, and eight casual workers and equipped with furniture and farm tools. Three hundred and sixteen accessions of medicinal plants were collected from different areas for planting in the FGB; of these, 76 died, mainly because they were not adapted to the elevation or were not frost tolerant. Taxonomic identification was done for 117 accessions (representing 101 species).

For the livelihood interventions, which were intended to provide alternatives to marketing forest products, 234 farmers were trained in the practical skills needed for the intervention they chose. Interventions included dairying (with an improved breed), sheep and bull fattening, goat production, apiculture, and petty trading (of butter). Some participants reported significant economic gains from their choice of livelihood intervention: for example, 19 women obtained ETB 1,000 each as a result of their butter trading.

The project's capacity-building component supported conservation goals by providing zonal and district stakeholders with a pick-up truck, motorcycles, and office equipment, and by providing farm implements to the traditional healers who piloted the home gardens for medicinal plants. The training received by stakeholder institutions' staff was an important human resource development contribution of the project. It enabled managers, experts, traditional healers, and development staff from different institutions to participate in training courses and share experiences in country and abroad.

As mentioned, the organization of traditional healers significantly furthered the project's conservation objectives. One THA was organized in each district for a total of 400 members, of which 48 are women. Organizational formalities were completed, including electing the executive committee, preparing bylaws, opening offices, and collecting registration fees and shares. The legalization of the registration process is still to be completed.

The public education program was disseminated on Radio Fana in Amharic for 10 minutes per week for three months in 2006, for a total of 120 minutes of air time. A public education program that mainly targeted school communities was transmitted in Oromiffa Region on the Robe Radio Education Broadcasting Program for one year, from January 2006 to February 2007.

IBC implemented recommendations from the study of the economic significance of traditional medicinal plants in Ethiopia by disseminating findings to key institutions and policy makers and publishing them in newspapers and magazines.

The activities implemented to date have yielded positive economic, ecological, social, and policy impacts, and at present the project appears sustainable. Additional effort is needed, however, to ensure further impact and sustainability. It is essential to complete the remaining tasks within the remaining time and develop a second phase of the project based on a thorough assessment of impacts and gaps.

ANNEX 8. COMMENTS OF COFINANCIERS AND OTHER PARTNERS/STAKEHOLDERS

Comments were provided by Dr. Tsige from the School of Pharmacy and Vice President of Research and Publication, Addis Ababa University.

The majority of traditional medicines used in developing countries have not been evaluated for quality, safety, and efficacy to the same standards as those in developed countries. Nevertheless, some remarkable claims are made for their effectiveness, and some traditional medicines have been subjected to "western" scrutiny.

In Ethiopia, modern healthcare is inaccessible to the vast majority of the population; drugs are in short supply and unaffordable. As a result, a high percentage of the population, particularly those in the rural areas, rely on traditional medicine obtained mainly from plants for the treatment of both human and veterinary diseases.

Despite this wide utilization of medicinal plants, very limited research has been conducted to integrate traditional medicine into the formal components of national healthcare. To address this situation, the Conservation and Sustainable Use of Medicinal Plants Project was initiated by the Ethiopian Government and the World Bank. Initial studies by the project indicate that herbal drugs make a significant contribution, not only to national and individual economic well-being but also as an alternative primary healthcare strategy.

A central objective of the project was to develop a few safe and effective herbal preparations into modern dosage forms. The clinical trials on *G. lotoides* tablets conducted at Tikur Anbessa Hospital on volunteer patients indicated that the drug is safe. Currently, preparations of various forms of the drug, including capsules, are underway to examine the efficacy of *G. lotoides* as an antihelminthic. Phytomedicines formulated for dermatological applications will soon undergo clinical trials.

In developing these phytomedicines, a multidiscipilinary, holistic approach was followed, which incorporated traditional knowledge, taxonomy, phytochemistry, standardization, pharmacology, toxicology, analysis, and formulation. A number of institutions and experts, including traditional healers, were mobilized to contribute to the project. Despite the challenges, valuable experience in teamwork was acquired.

Because the development of phytomedicines is a new endeavor in the country, the project has enormously contributed to the formulation of protocols on ethical clearance by the Ethiopian Science and Technology Agency and clinical trials by DACA. Such protocols had not existed for phytomedicines. Furthermore, the project has also triggered the preparation of intellectual property guidelines for phytomedicines.

Successful completion of clinical trials for the above-mentioned drugs promises to lead to industrial production. The recent establishment of University–Industry Partnership Office at the School of Graduate Studies and Research of AAU is expected to facilitate the incubation and transfer of technology from research labs to industry. Such an undertaking paves the way for Ethiopia to achieve its goal of incorporating phytomedicines into the formal healthcare delivery system. For this reason, continuation of the project and support from the World Bank appear to be vital.

ANNEX 9. LIST OF SUPPORTING DOCUMENTS

1. World Bank: Project Appraisal Document on a proposed Learning and Innovation Lending and a proposed Grant from the Global Environment Facility, January 2001.

2. World Bank: Development Credit Agreement, ET Conservation and Sustainable Use of Medicinal Plants Project.

3. World Bank: Global Environmental Facility Trust Fund Grant Agreement, ET Conservation and Sustainable Use of Medicinal Plants Project.

4. World Bank: Project Status Reports (PSRs) and Implementation Status Results and Reports (ISRs) 2001-2007

5. ET Conservation and Sustainable Use of Medicinal Plants Project Aide-Memoires of Supervision Missions and Mid-Term Review Aide-Memoire

6. The World Bank Technical Paper No. 355: Medicinal Plants – Rescuing a Global Heritage

7. The Ethiopia Herald – "Marketing medicinal plants in Ethiopia: a survey"

8. IBC's Assessment Report of Impact of Project Intervention

9. Marketing of Medicinal Plants in Ethiopia – a survey prepared by Myles Mander and WAAS International

10. Medicinal Plants and Other Useful Plants of Ethiopia – illustrated checklist

ADDITIONAL ANNEX 10. CAPACITY BUILDING

Human resource development was implemented through experience sharing, study tours, and short-term training, both abroad and in country. The major human resource development activities that were accomplished include:

- The project coordination office was established under the Oromia Bureau of Agriculture and Rural Development at the zonal level in Robe and staffed with a project coordinator, technical assistant, and accountant.
- In the second year of the project, six management staff from stakeholder institutions participated in a study tour to Sri Lanka and India to exchange knowledge and lessons learned on the sustainable use of indigenous medicinal plants. Staff included the Deputy Director General of IBC and Coordinator of CSMPP; the Director General of the Ethiopian Health and Nutrition Institute (EHNRI) and Ethiopian Science and Technology Agency (ESTA); and the chairman of Traditional Healers Association (THA).
- Seven IBC staff and one team leader (natural resources) from the zonal office and the park participated in a study tour to India to share experiences in natural resource conservation techniques.
- One high-level IBC manager and the project coordinator visited China and Korea to explore experiences regarding development and institutional management of traditional medicine.
- Eight staff from Oromia and IBC participated in an experience-sharing tour in Tanzania on natural resource conservation.
- A local study tour was organized to Semen Mountains National Park, Amhara National Regional State, involving 14 participants from Oromia, IBC, and PCMU.
- Six experts (two each from BMNP, Oromia Bureau of Agriculture and Rural Development, and IBC) were trained in geographic information systems at AAU, Ethiopia.
- A manual on propagation and cultivation of medicinal plants was prepared and training given to 210 traditional healers, 6 nursery staff, 10 development agents, and 6 district experts (focal persons).

The overseas training had major benefits. For example, the IBC in situ conservation training improved participants' capacity to conduct their work at home as well as their ability to communicate abroad. Training in the extraction and standardization of the active principles of medicinal plants offered the benefits of international collaboration. Finally, training on the commercialization of traditional medicines in Oromia offered opportunities for the regional government to seriously examine the market possibilities for traditional medicines.

MAP

I N S E R T

M A P

H E R E

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A minimum of a one week turnaround is required

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