Darwin Initiative for the Survival of Species

Final Report

Contents

Darwin Initiative for the Survival of Species

Final Report

1. Darwin Project Information

Project title	Biodiversity conservation in ancient church and monastery yards in Ethiopia
Country	Ethiopia
Contractor	University of Wales Bangor
Project Reference No.	162/10/031
Grant Value	£149,091
Staring/Finishing dates	1st April 2001 / 31st March 2004

2. Project Background/Rationale

The sacred church and monastery lands of the Ethiopian Orthodox Tewahido Church have survived for many centuries as islands of natural forest biodiversity in a sea of deforested landscape across much of the Ethiopian highlands. For many interesting reasons related to the spiritual values attached to the churches, monasteries and their sacred lands, these biodiversity islands have survived the general pressure for timber and fuelwood gathering that has degraded the surrounding landscape. However, the biodiversity of some of these churchyard forests is currently being depleted due to the pressures created by the continued deforestation of the surrounding areas for fuelwood and timber. Key Ethiopian NGO and government institutions identified the need for conservation of the important populations of threatened species retained in ancient church and monastery sacred lands. To enable this, the project aimed to strengthen institutional capacity through training, expert advice, networking (institutions/local stakeholders), financial support and joint project implementation.

3. Project Summary

Project purpose: Sustainable development in Ethiopia promoted through participatory conservation of the biodiversity of the forests preserved on sacred lands, and their establishment as a resource of value to alleviate local poverty and for the nation as a whole (See Appendix V for Logical Framework).

Project objectives: Strengthen capacity of Ethiopian NGO and government institutions through training, expert advice, enhanced networking (amongst institutions and local stakeholders), financial support and joint project implementation. Successfully implement a project that conserves the biodiversity of sacred lands in situ, and where necessary ex situ with subsequent reintroductions.

Summary: The project was carried out over a three year period in Ethiopia between 1st April 2001 and 31st March 2004. In order to meet the above objectives, the project was divided into three phases. The objective of the first phase was to generate baseline information on the biodiversity status of Church and Monastery yards in Ethiopia by selecting representative sites across the country. The second phase was aimed at obtaining detailed information on selected focus sites of biodiversity importance/significance. The information gathered during the second phase was used to develop participatory conservation plans for the selected focus sites, which was the objective of the third or final phase.

During the first phase, which was carried out in the first year of the project, a collaborative network between government, educational and non-governmental organisations (10 in total) concerned with biodiversity conservation and local stakeholders in Ethiopia was initiated by inviting them to participate in the 1st project planning workshop (August 2001). During the first phase rapid biodiversity assessment was successfully carried out in 38 church and monastery yards. The first phase field activities were delayed due to a number of logistical and administrative problems. Due to delay in the approval of the project contract by DEFRA and consequently the late recruitment of project staff, the project activities in the field began five months after the official starting date. Despite the field vehicle having been carefully selected, it was plagued by a variety of major breakdowns. These seriously disrupted the fieldwork schedule. As a result, the first phase fieldwork activities were extended into the second year of the project.

Based on the results of the first-phase rapid biodiversity assessment, seven focus sites were chosen to represent a stratified sample of church and monastery sites across a spectrum of geographical settings, remaining forest area and threat, for detailed participatory biodiversity appraisal in the second phase. The second phase field activities began late in December 2002 due to the delay in the first phase field activities (described above) and because of the need for a change in the staffing arrangements for the project after the departure of the UWB research officer. As a result, the second phase fieldwork activities were extended into the final year of the project. During the second phase, participatory biodiversity appraisal studies were successfully carried out in the chosen seven focus sites: Aba Asrat Monastery, Debrelibanos Monastery, Ziqualla Gebre Maenfeskidus Abo Monastery, Mihur Eyessus Monastery, Geja Georgis Church, Debre Benkol Monastery and Anchucho Medihanealem Church.

During the third or final phase of the project, it was decided that the development of conservation plans should prioritise sites with greater potential for success. Thus, the Ethiopian project team, based on the second phase data and personal observations, excluded two of the seven sites from the final phase activities: Debre Benkol monastery and Anchucho Medihanealem church. Thus, the development of biodiversity conservation plans was successfully achieved for five of the seven focus sites. The

development of the conservation plans involved as many relevant stakeholders as possible to maximise the success of future implementation of the plans. The Ethiopian research team travelled to all the five focus sites to facilitate this process. The plans were presented, discussed and agreed at the final project workshop held in January 2004. In addition to representatives of the collaborative network organisations, representatives of the five monasteries and the surrounding local communities participated in this final workshop.

Articles under the Convention on Biological Diversity (CBD) that describe the project are 6, 7, 8, 9, 10, 12 and 17 as set out in more detail in Appendix I.

4. Scientific, Training, and Technical Assessment

4.1. Research achievements

The following researchers participated in this project:

1. Dr. Zewge Teklehaimanot: principal investigator, expertise in tropical forestry and agroforestry, University of Wales Bangor
2. Dr. John R. Healey: co-principal investigator, expertise in tropical forest ecology and conservation, University of Wales Bangor
3. Dr. Pierre Binggeli: research officer, expertise in forest ecology, University of Wales Bangor
4. Dr. Bianca Ambrose: consultant, expertise in environmental sociology, natural resource management and sustainable livelihood, participatory biodiversity appraisal, University of Wales Bangor
5. Dr. John B. Hall: technical advisor, expertise in tropical forestry, University of Wales Bangor
6. Mr. John Smith: consultant, expertise in sacred land conservation, Alliance of Religions and Conservation, Manchester, UK
7. Mr. Kinfe Abebe: project manager, expertise in forestry, Ethiopian Wildlife and Natural History Society
8. Mr. Desalegn Dessisa: research officer, expertise in ethnobotany, Ethiopian Wildlife and Natural History Society
9. Mr. Getachew Adane: research officer, expertise in sociology, Ethiopian Wildlife and Natural History Society

4.1.1. First Phase Study

4.1.1.1. Study sites

The project activities began with a workshop, which took place in Addis Ababa (1-2 August 2001). The aims of the workshop were to get acquainted with one another, to enhance networking amongst institutions and stakeholders, and to discuss and define more precisely the work to be undertaken in the project. A broad range of the government, educational and non-governmental organisations concerned with biodiversity conservation and stakeholders in Ethiopia participated in this first planning workshop in order to initiate a network of collaboration. This collaborative network was further enhanced through subsequent workshops and fieldwork. The organisations that joined this collaborative network include Ethiopian Orthodox Tewahido Church, Ethiopian Wildlife and Natural History Society (EWNHS), Environmental Protection Authority, Institute of Biodiversity Conservation and Research, Ethiopian Agriculture

Research Organization, Ethiopian Wildlife Conservation Organization, Ministry of Agriculture, Addis Ababa University, Forest Research Centre, National Tree Seeds Project. At the workshop the historical and theological background of the project was discussed as well as the criteria for the selection of the first phase study sites. In view of the existence of a large number of potential sites (around 35,000 churches and monasteries) in Ethiopia, it was decided that the project should focus on up to 40 representative sites chosen using the following criteria: the church or monastery must be more than 100 years old, have abundant semi-natural vegetation, represent a good geographical spread across the Ethiopian highlands (above 1500 m a.s.l.), and be well known to EWNHS staff. A provisional list of 38 church and monastery grounds to be screened by the project was made at the workshop based on the above criteria. The Darwin project team visited these sites and preliminary consultation was carried out with local church authorities and community members. Subject to their approval a rapid biodiversity assessment was carried out at each of the 38 sites.

4.1.1.2. Research methodology

The aim of the rapid biodiversity assessment was to obtain a rapid, but precise, understanding of the biodiversity value and conservation potential of each site as well as gaining an insight into the uses of woody plant resources by the clergy and local people. At each site the following studies were carried out: (1) rapid biodiversity assessment of woody plants, (2) interviews with clergy and local people, and (3) general appraisal of the local environment and photographic record.

The rapid biodiversity assessment involved the identification of all woody plant species at each site. When in doubt, plant specimens were collected to confirm their taxonomic status in the National Herbarium of Addis Ababa University. Estimates of the number of each species were also made. Qualitative observations, supported by photographic records, were made on the local environment including the presence of natural woodland in the vicinity of the sacred site and the extent of local tree resources. The structure of the vegetation (e.g. tree height, presence of shrub layer, nature of the ground vegetation, etc.) was recorded. Human influences on the vegetation, such as signs of tree cutting, grazing pressure and soil erosion, were noted.

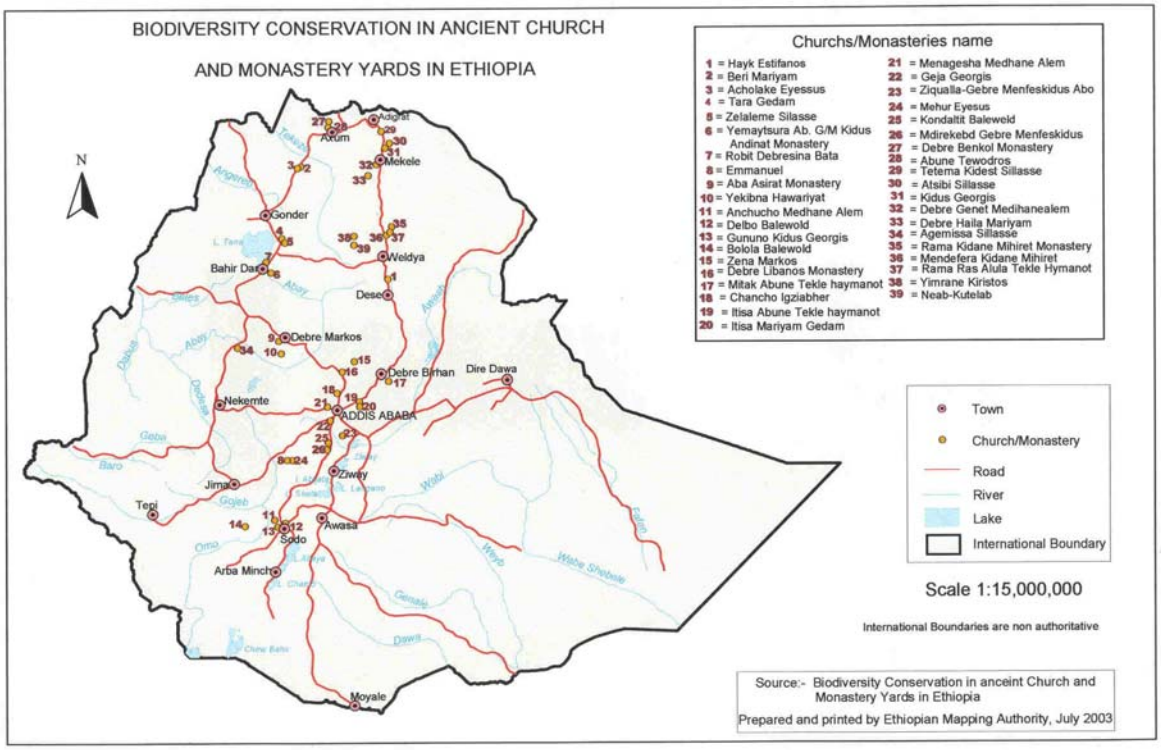
At each site discussions were held with monks, priests, deacons and local people to gain a broad understanding of the area's history and how people use and manage the natural vegetation. Plants used by the local community were identified during formal interviews with nine key (knowledgeable) informants identified by the main priest or the church representative. Informants also provided quantitative information on mammals and to some extent on bird species present in the church and monastery yards. The social interaction between various stakeholders groups (e.g. clergy, local farmers, other religions) as they affect the use and management of the forest resources was also a major component of the fieldwork investigation. Information on the uses (e.g. food, medicine, timber, fuel, etc.), and cultural aspects of these plants was also gathered from a larger number of informants. In total 339 people were interviewed. Various threats to these protected forests were identified and these were extensively discussed with religious people. Possible propagation methods of rare and locally threatened plant species were also discussed.

4.1.1.3. Results of the first phase study

Over 230 species of woody plants were recorded at the 38 sites (18 monasteries and 20 churches) stretching throughout the Ethiopian Highlands where the Ethiopian Orthodox Churches are present, i.e. between 6^{o}N and 14^{o}N (Figure 1, Table 1). Out of the total 38 sites, only 5 sites (4 monasteries and 1 church) had undisturbed forests. The majority of the sacred land forests are disturbed and are under threat as a result of low to high population and grazing pressures.

Most of the plants referred to as useful by informants were trees and they were used, in decreasing order of importance, for construction, fuelwood, household implements, farm implements, medicine, food, and religious purposes (crosses, religious sticks, drums, carvings). Shrub species were used for roofing, house construction, brooms, floor covering during religious festivals and a source of dyes. A few non-woody plants were recorded and these were used in medicine. In general local communities knew the local plant resources. Roughly half of the woody species present in the church and monastery forests were used and generally these species would be common. *Cordia africana* and *Podocarpus falcatus* are extensively harvested at unsustainable levels. With the exception of *Olea europea* and sometimes *Podocarpus falcatus* and *Ficus thonnigii*, woody species are not propagated or planted. In general, informants from church sites appeared to be more knowledgeable than those from monasteries. In most monasteries many monks are not locals and seem to have a poor knowledge of the indigenous flora and of plant uses. In general the communities were keen to see native trees planted, but would only consider planting if outside help became available. However, they identified water shortage and lack of seedlings as problems to be addressed if planting is to be carried out. The impression gained at most of the sites is that both the clergy and the local people are keen to protect their tree resources but the lack of both resources and knowledge prevents them from taking an active role in conservation. In the majority of cases any help that could be provided by this Darwin Initiative project was viewed as a key factor in the conservation of local biodiversity.

Figure 1. Location of study sites



N.B. Please note that no data was collected in site 34. Thus, data exists only for 38 sites.

Table 1. Summary of Phase 1 research results

(a) Monasteries

No	Monastery name	Age*	Size of forest (ha)	No of woody species recorded	No of plant species used	Forest disturbance	Population pressure	Grazing pressure
1	Yemaytsura Ab. G/Menfeskidus	medium	>10	47	32	no	low	medium
2	Aba Asrat	medium	>10	51	55	yes	high	high
3	Zena markos	medium	1	48	27	yes	low	low
4	Debrelibanos	old	5	62	25	yes	high	high
5	Mitake Abune Teklehaimanot	medium	5	43	30	no	low	low
6	Itisa Abune Teklehaimanot	old	5	41	18	yes	medium	medium
7	Itisa Mariam Gedam	medium	2	34	24	yes	low	medium
8	Menagesha Medhane Alem	medium	1	37	22	yes	low	medium
9	Ziqualla-Gebre Menfeskidus Abo	old	300	34	50	no	high	high
10	Mehur Eyessus	old	2	31	36	no	low	no
11	Kondaltiti Baleweld	medium	2	33	16	yes	low	medium
12	Mdirekebd Gebre Menfeskidus	old	2	30	24	yes	low	medium
13	Bokal Gedam	old	>10	36	21	yes	high	high
14	Debre Haile Mariyam	old	5	41	15	yes	low	high
15	Rama Kidanemihret	old	>10	21	23	yes	low	low
16	Neab-Kutelab	old	5	30	28	yes	low	high

17	Tara Geddam	old	>50	43	56	yes	low	low
18	Hayk Estifanos/ Abune Eyessus Moa	old	1	39	30	yes	medium	medium

(b) Churches

	Church name	Age*	Size of forest (ha)	No of woody species recorded	No of plant species used	Forest disturbance	Population pressure	Grazing pressure
1	Acholake Eyessus	medium	1	39	n.a.	yes	low	medium
2	Beri Mariam	medium	2	23	22	yes	low	medium
3	Zelalem Sillasse	medium	1	46	32	yes	low	medium
4	Robit Debresina Bata	medium	3	40	12	yes	low	low
5	Yekibna Hawariyat	medium	5	62	45	no	low	low
6	Anchucho Medihanealem	medium	2	50	14	yes	high	high
7	Delbo Baleweld	medium	1	43	16	yes	low	low
8	Gununo Kidus Georgis	recent	2	51	44	yes	low	low
9	Bolola Baleweld	recent	1	43	12	yes	low	low
10	Chancho Igziabher	recent	1	33	15	yes	low	high
11	Geja Georgis	medium	1	36	10	yes	low	high
12	Emmanuel	recent	1	22	20	yes	low	low
13	Abune Tewodros	medium	1	34	13	yes	low	high
14	Tetema Kidest Sillasse	old	2	40	32	yes	low	low
15	Atsibi Sillasse	medium	2	46	36	yes	low	medium
16	Kidus Georgis	medium	5	39	41	yes	low	high
17	Debre Genet Medihane Alem	old	2	54	11	yes	low	medium
18	Mendefera Kidane Mihirat	recent	1	21	16	yes	low	medium
19	Rama Ras Alula Teklehaimanot	medium	1	37	11	yes	low	medium
20	Yimrana Kirstos	old	50	24	32	yes	low	high

*old = >200 years, medium = 100-200 years, recent = <100 years

The detail results of the first phase project findings from the 38 church and monastery sites are now placed on the project website given below for public access and a hard copy of these is enclosed.
http://www.safs.bangor.ac.uk/ethiopia

4.1.2. Second Phase Study

4.1.2.1. Study sites

Based on the baseline information generated from the first phase fieldwork, a stratified sample of seven focus sites of biodiversity importance/significance were selected for the second phase project activities. The following criteria were used to select the focus sites: representation of ecological, ethnic and administrative regions; emphasis on old sites and sites of religious significance; site accessibility and feasibility for study; sites with high conservation value; a mixture of churches and monasteries; a mixture of sites with different levels of threat. Based on the above criteria the following seven sites were chosen: Aba Asrat Monastery, Debre Libanos Monastery, Ziqualla Monastery, Mihur Eyessus Monastery, Geja Georgis Church, Debre Benkol Monastery and Anchucho Medihanealem Church.

4.1.2.2. Research methodology

To ensure full participation of local communities and the clergy in the conservation and management of the church and monastery forests, detailed participatory biodiversity

appraisals are indispensable. Therefore, a participatory biodiversity appraisal methodology was designed and carried out beginning in December 2002 at the above seven focus sites.

The research objectives of the participatory appraisal were: 1) to elucidate the values placed on sacred land biodiversity by different stakeholders; 2) to discover why sacred land biodiversity has been conserved and if and how this relates to those values and beliefs; 3) to elucidate the relationships between these values and religious or spiritual belief systems; 4) to understand wider attitudes to conservation; 5) to understand wider issues concerned with planting and protection generally; 6) to assess the potential at each site for initiating a process which supports the planting of species of conservation importance and develops in-situ monitoring techniques, which will lead to the development of conservation management planning.

Various participatory tools were used. At each site, group discussions and structured and semi-structured interviews were conducted to gather information on local attitudes toward sacred land forest conservation, resource use patterns, relationships between people and the sacred land forest, and the perceptions of the community living around the forests. The mapping of the lands of the monastery or church forest and its environs, transect walk and scoring and ranking of species were conducted with the clergy and selected key informants from the community of the surrounding area. Oral histories of the community and their tradition relating to resource use and forest cover were recorded. The methodology was refined after being tested in two sites (Kondaltiti and Chancho). Hard copies of the MSc degree dissertation of the University of Wales Bangor, which reports the work carried out to test the methodology at Kondaltiti monastery by Matthew Painton (2002) and the report on the methodology development and refinement based on Chancho church conducted by Bianca Ambrose (2003), are enclosed.

A biophysical survey was conducted at each site to analyse the present plant status, and current pressure on sacred land forest resources. A one-hectare (100 m x 100 m) sample plot was established in the forest at each site. The location of the sample plot was selected to reflect the natural range of variation in the forest. A stratified sample of 25 sub-plots, each of 10 m x 10 m, were sampled in each plot and permanently marked. Within each sub-plot a further quadrat of 5 m x 5 m was used to sample regeneration (<1 m high trees) and saplings (>1 m height and <5 cm diameter at breast height (dbh)). The total sampling area was 2500 m^2 (0.25 ha). Variables such as tree density, dbh, species richness, natural regeneration, evidence of tree cutting, grazing livestock, and signs of fuel wood collection and charcoal production were recorded.

4.1.2.3. Results of the second phase study

I. General

There was distinct difference between monasteries and the churches. The monasteries have higher number of tree species (with the exception of Debre Benkol monastery) and larger area of forests than the churches (Table 2). Both monasteries and churches are, however, are under threat from various sources.

A large number of woody species recorded are common to all the seven sites and all of them are endemic to afromontane vegetation type (White, 1983). Afromontane forest

ecosystem is known to be diverse and rich in endemic species (Friis, 1992; Lovett and Friis, 1996). This explains why large number of woody species was recorded in the seven sites (230 woody species). Afromontane ecosystem is also one of the Vavilov's centres of origin and/or diversity for many domesticated plants and their wild relatives, e.g. wheat, barley, teff and coffee (Teketay and Bekele, 1995).

Among the tree species recorded in the seven focus sites, 14 species were identified as national priority conservation tree species (IBCR, 2003) and three of them are in IUCN's red list (WCMC, 1996) (Table 3).

Based on the scoring and ranking of species exercise conducted at each site, the clergy and community members identified additional species of trees that they highly value for meeting their needs for timber, fuelwood, aesthetic and spiritual purposes (Table 4).

Table 2. Sacred land forest status and threats

.

	Debre Libanos	**Aba Asrat**	**Mihur Eyessus**	**Debre Benkol**	**Ziqualla**	**Geja Georgis**	**Anchocho**
Age (years)	734	120	645	200	842	147	124
Forest area (ha)	12	12	10	56	300	1	4
No of woody species recorded	75	84	83	44	56	26	51
No of mammal species recorded	6	7	10	4	6	0	4
Source of threat							
(a) Grazing livestock	High	High	None	High	High	High	High
(b) Wood extraction by surrounding local communities	None	High	None	High	High	None	High
(c) Expansion of modern grave	High	None	None	Low	Medium	Low	Low
(d) Wood harvesting by the monastic and church community	High	Medium	Medium	High	High	Low	High
(e) Conflict with local communities	None	High	Medium	High	High	None	Low

Table 3. National and international conservation priority indigenous species identified in the sacred land forests

Tree species	**Priority category**	**Debre libanos**	**Aba Asrat**	**Mihur Eyessus**	**Debre Benkol**	**Ziqualla**	**Geja Georgis**	**Anchocho**
Juniperus procera	IUCN Red list[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Olea europea subsp.cuspidate	High national priority, IBCR[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prunus africana	IUCN Red list	Yes	Yes	Yes				Yes
Podocarpus falcatus	High national priority, IBCR	Yes		Yes				Yes
Acacia abyssinica	High national priority, IBCR	Yes	Yes					Yes
Cordia africana	High national priority, IBCR	Yes			Yes			
Ficus sur	High national priority, IBCR	Yes	Yes					
Dombeya aethiopica	IUCN Red list		Yes					
Albizia gummifera	High national priority, IBCR		Yes					
Ficus vasta	High national priority, IBCR						Yes	

Acacia nilotica	High national priority, IBCR		Yes					
Acacia albida (Faidherbia albida)	High national priority, IBCR						Yes	
Olea capensis	High national priority, IBCR			Yes				
Hagenia abyssinica	High national priority, IBCR					Yes		

[1]WCMC (1996), [2]IBCR (2003).

Table 4. Indigenous species highly valued by the local church and monastery communities for their wood, aesthetic and spiritual values

Debre Libanos	**Aba Asrat**	**Mihur Eyessus**	**Debre Benkol**	**Ziqualla**	**Geja Georgis**	**Anchocho**
Carissa edulis	*Albizia schimperiana*	*Garcinia buchananii*	*Albiza amara*	*Olinaea rochetiana*	*Croton macrostachyus*	*Galiniera saxifraga*
Maytenus arbutifolia	*Apodytes dimidiata*	*Phoenix reclinata*	*Croton macrostachyus*	*Mimusops kummel*	*Maytenus arbutifolia*	*Ekebergia capensis*
Dombeya torrida	*Allophylus abyssinicus*	*Syzygium guineense*	*Acacia etbaica*	*Acacia gerrardii*		*Apodytes dimidiata*
Schefflera abyssinica	*Myrica salicifolia*	*Olinia rochetiana*	*Mimusops kummel*	*Protea gaguedi*		*Erythrina abyssinica*
Rhus glutinosa	*Clausena anisata*			*Grewia bicolor*		*Pittosporum abyssinica*
	Carissa edulis			*Premna resinosa*		*Allophylus abyssinicus*
	Schefflera abyssinica			*Euclea schimperi*		*Dombeya torrida*
	Rhus glutinosa			*Brucea antidysenteria*		
	Teclea nobis			*Rhus glutinosa*		
	Olinaea rochetiana					

II. Site specific results

i) Debrelibanos Monastery

Debrelibanos monastery is located at 104 km from Addis Ababa in the North Shewa Zone of Oromia State. It is located at 2400 m altitude whilst the rim of the valley rises to over 2560 m. Its geographical location is $38^0$51'E, $09^0$41' N. The drainage from the surrounding highlands drops steeply into the flat land of the gorge where the monastery is located. The soil is dark grey and fertile, which indicates eroded top-soil deposits from the lava plateaus. The monastery is situated at the edge of the highland plateau on the flat ground below the first escarpment of the Jama gorge. The sides of the gorge descend in a series of parallel escarpments towards the river. The first escarpment (the surface rock of the plateau) is marked by massive cliffs formed by the thick layers of basaltic lava and this leads to the flat land where the monastery is located. Below these and forming the cliffs, which overlook the river, are layers of more recent sedimentary rocks (various kinds of limestone). The lowest benches of the gorge, therefore, are not densely populated. Some small settlements and some patches of cultivation can nevertheless be seen. The mean annual rainfall is 1200 mm, and there are five rainy months, May-September, with a peak in July. Mean annual temperature 23^{o}C. Mean length of dry season(s) is 4 months (source: North Shewa Agricultural Office).

The forest at Debrelibanos Monastery is one of the few remaining dry afromontane forests. The natural tree cover of the monastery consists of three distinct areas. These are large *Olea europea* ssp. *cuspidata* woodlands on the northern side of the monastery where both traditional and modern types of burial system take place. Starting just below the cliff on the steep and moderate part of the slope there is a mixed woodland with patches of planted Eucalyptus and to the south west there is a pure Eucalyptus plantation. The mixed forest covers areas from the east to some parts of the south west of the monastery lands. The total number of woody plant species recorded in the monastery lands is 75 representing at least 49 families of flowering plants and conifers. 80.7% are trees, 19.02% shrubs, 0.27% climbers and 0.11% woody herbs. The main high canopy tree species in the mixed forest include *Allophylus abyssinicus, Prunus africana, Juniperus procera, Olea europea* ssp. *cuspidata, Millettia ferruginea, Dovyalis abyssinica* and *Schefflera abyssinica.* The shrub layer includes *Carissa edulis, Maytenus arbutifolia, Myrsine africana, Capparis micrantha, Vernonia auriculifera* and *Vernonia leopoldii.* The forest is rich in highland biome birds and other wild animals. Among the common mammals found are the endemic chilada baboon, bush duiker, anubis baboon, rodent, rock hyrax, rabbit, porcupine, and aardvark.

Debrelibanos monastery was founded by Saint Teklehaimanot during the reign of Yekunno Amlak in 1270 (Ayele Teklehaimanot 1950). It was known as Dabre Asbo for about 160 years and, then Emperor Zar'aYaqob changed its name to the present name of Dabrelibanos in 1434 (Ayele Teklehaimanot 1950). The monastery was destroyed by the Muslim army of Mohammed Gragn in 1532. According to informants the monastery was also ravaged and destroyed during the battle between Christians ruled by Gelawdewos and the same Muslim army in 1559. The present church was built by Emperor Haile Sillasse in 1960. From the account of knowledgeable elderly monks, before and during the 1974 revolution, Debrelibanos was a heaven for wild life including bush buck, duieker, leopard, porcupine, pig, and warthog, in addition to a variety of birds, reptiles and amphibians. The wildlife and plant species have been significantly reduced since 1974. According to the informants, there are several reasons, the most significant being the multiple use of the forest that was permitted after the revolution in 1974. However, most of this wildlife has disappeared following the clearance of the forest due to expansion of settlement in the middle of the forest, which has shrunk from its original of over 50 ha to the present size of 12 ha. Nevertheless, the monastic community continues to depend on the forest for fuel wood. The monks are permitted to take as much wood as is necessary for their fuel. Although the informants insisted that they cut trees which are carefully selected among those that showed signs of aging and decay, the research team identified young trees especially *Acacia abyssinica* and *Prunus africana* cut and coppicing in the northern part of the monastery land during the present study. There is no belief system associated with individual tree species except the olive tree that is linked to Saint Teklehaimanot. According to a legend, the olive tree was brought to Debrelibanos by the Saint.

At present there are 700 registered monks besides many hermits who reside in the monastery in addition to approx. 4000 permanently settled pilgrims. Debrelibanos monastery is the only monastery where all subjects of church education are taught. Every year around 2000 students receive religious education at the monastery. According to the informants the monastery also gives services for many daily visitors estimated to be around 3000 per day who mostly come to visit the springs to obtain holy water. Thus, this

ever-expanding human population is exerting tremendous pressure on the forest. The monastery forest is also used as the grazing area for cattle belonging to the monks and this has put another pressure on the forest. The expansion of the area occupied by modern graves has further reduced the undisturbed forest area.

ii) Geja Georgis Church

Geja Georgis is situated on top of a small hill 2 km away from the road to Butajira, 47 km from Addis Ababa; altitude 2220 m. Its geographical location is 08^{0}50'N, 38^{0}38'E. The area around Geja Georgis is flat and highly cultivated with little fallow land. Mixed farming including crop production and animal husbandry is practised. On the hill slope behind the church building there are recent active volcanic bubbles. The annual rainfall of the area is 1150 mm with an annual mean temperature of 18^{o}C (Alem-gena District Agricultural Office).

Natural vegetation in the area is sparse. Eucalyptus plantations are common around private croplands for cash income and to produce poles for construction. Conspicuous dense vegetation can only be seen around the church. Even, this is a very small cluster located at the top of the hill and characterized by very few species. These include: *Euphorbia candelabrum, Olea europea* ssp. *cuspidata* and the exotic *Eucalyptus camaldulensis.* As the density of the vegetation around the church is sparse, no significant wildlife populations were found.

Geja Georgis church was established in 1857. According to the informants the church first had a grass roof, and then a corrugated iron roof was built by the order of Emperor Menilik. During the Italian invasion, the Italian army destroyed the church. According to elderly knowledgeable informants the original vegetation of the surrounding area was mainly grassland with scattered trees of *Acacia albida* and shrubs of *Carissa edulis.* There were several indigenous naturally grown plant species on the church land during the reign of the Emperor Haile Sillasse. Most of them were shrubs and a few tree species including *Buddleja polystachya, Croton macrostachyus*, *Vernonia amygdalin*a and *Premna schimperi*. *Carissa edulis* and *Rosa abyssinica* were also plentiful on the slope of the hill. All *Olea europea* ssp. *cuspidata* trees were planted by the clergy and the local landlords.

According to the history and time line study, key informants described that, during the early stage of the revolution in 1974, most of these plants were destroyed as the country was stateless and there were no rules and regulations, which prevented people from illegal acts. The transition from the Derg regime (1974-1991) to the present government has not brought any significant change in this situation. At present, the church-yard is highly overgrazed and eroded. Yet, there have been no initiatives to restore the natural flora; the only planting has been of exotic tree species, especially *Eucalyptus* spp. established for their high economic value.

The total number of woody plant species recorded in the area is 26 representing at least 21 families of flowering plants and conifers. Of these four are exotics, 1.5% are trees and 98.4% shrubs. The most abundant species were *Justicia schimperiana* and *Euphorbia candelabrum.* Farmers in the vicinity have traditionally deliberately kept *Acacia albida* on their farmland. They believe that it increases soil fertility.

iii) Aba Asrat Monastery

Aba Asrat monastery is established in a deeply dissected valley. The lower reach is 2100 m above sea level whilst the rim of the valley rises to over 2360 m. It is located 8 km south of Debremarkos close to the main road to Addis Ababa. Its geographical location is $37^0$45' E, and $10^0$17' N. The landscape is characterized by recent volcanic rock giving rise to various rolling and undulating slopes. The soils are reddish brown at higher altitudes, while in the lower valley they tend to become dark-grey and deep with a characteristically high clay content. The mean annual rainfall is 1300 mm, and there are five rainy months, May-September, with a peak in July. Mean annual temperature 15.6^{o}C and the mean length of the dry season(s) is 4 months (Eastern Gojjam Natural Resource Office).

The monastery is situated on the western slopes of a canyon right at the edge of the main highland plateau. This small canyon runs south and feeds directly into the Blue Nile. The upper part of the monastery land is delimited by a ca. 50 m high cliff whilst the remainder consists mainly of a steep slope down to the river edge.

The entire monastery land and nearby communal lands are believed to have once been covered by a forest of *Albizia schimperiana, Albizia gummifera, Prunus africana, Acacia abyssinica, Apodytes dimidiata, Ekebergia capensis, Ficus* spp., *Schefflera abyssinca, Rhus glutinosa* and *Allophyllus abyssinicus*. The original forest has now been reduced from the original of over 50 ha to 12 ha as a result of excessive cutting for fuel wood, construction of traditional houses, farm implements, household utensils and charcoal by the surrounding community and the clergy. At present shrubs and coppice regrowth dominate most of the landscape.

The total number of woody plant species recorded in the area was 84 representing at least 45 families of flowering plants and conifers. Among these, 37% were trees, 53.7% shrubs, 3.7% climbers and 5.6% herbs. The most frequently encountered species was *Albizia schimperiana* (frequency 100%). It was also the most abundant species. Only four species occurred in more than 50% of the plot, indicating dominance by a few species. The forest is also the major grazing land for livestock of the monks and the residents surrounding it. At present, while the density of some of the important species such as *Olea europea ssp. cuspidata, Olinia rochetiana, Prunus africana, Albizia gummifera* and *Pittosporium virdiflorum* has been reduced extensively (for example only one *Olea*, two *Prunus*, one *Olinia* and three *Pittosporium* trees exist on the monastery land), other species such as *Acacia abyssinica, Myrica salicifolia, Apodytes dimidiata, Bersama abyssinica, Allophylus abyssinicus, Rhus glutinosa, Dracaena steudenri, Carissa edulis* and *Acacia nilotica* have persisted at a higher density. The forest is rich in highland biome birds and other wild animals. Among the common mammals found are the endemic subspecies Menelik's bushbuck, as well as bush duiker, anubis baboon, colobus monkey, rodent, rock hyrax, rabbit, porcupine, aardvark, civet, and genet. Different lizard species and a green grass snake were seen during the present study.

According to the history and time line study, key informants described the valley area including the Aba Asrat monastery as having been covered with a high density of tree and shrub species at the time of the Italian occupation of Ethiopia (1939-1941); the forest was used as camouflage/cover by the Ethiopian army. The pressure on biodiversity was very low as the human population density was low. During the reign of Haile Sillasse

(1941-1973), the area was still covered with a high density of trees. After the Derg took over from Haile Sillasse in 1974, the proclamation nationalizing rural lands in 1975 changed the basis of land ownership. Some parts of the Aba Asrat monastery forest came under community ownership. Land redistribution and a reduced sense of ownership resulting from limited usufructuary rights led to the emergence of a severe sense of tenure insecurity. As a result the monks in the monastery removed all of the trees from the flat part of the monastery forest and sowed crops of maize (*Zea mays*) and tef (*Eragrostis tef*) continuously for three years (1975-1978). The situation resulted in the breakdown of local institutions and opened the way for local people to collect fuelwood despite the Derg's strong forest protection program. People from Chemoga village, which is part of Debre Markos town (8 km from the monastery) began to collect fuelwood frequently to generate additional income. All interviewees reported that deforestation and degradation of the monastery forest was further accelerated immediately after the fall of the Derg in 1990. This was symptomatic of the brief period of transition at that time when there was instability and a lack of government control. A lot of the demobilised Derg army settled in Debre Markos and being amongst the poorest households in the area they engaged in collecting wood as a survival strategy. Although some of them left later on for their respective homes elsewhere in Ethiopia, those who remained, together with the local landless people and widows of the militia, still use the monastery woodland as a source of fuelwood and charcoal for their daily livelihoods. The conflict between the monks and livelihood groups who are using the monastery forest as a source of income and subsistence is rising and this is another threat to the monastery forest.

iv) Mihur Eyessus Monastery

Mihur Eyessus monastery is located 200 km south west of Addis Ababa and 50 km from Welkite. It has an altitude of 2050 m and its geographical location is $08^0$05', $37^0$55'. The topography around Mihur Eyessus monastery includes high cliffs, gently undulating hills and flat land. There are several patches of forest in the surrounding areas, but most of the land between them is eroded. There are three rivers passing within the vicinity of the monastery adding beauty to the area. Among the three rivers, the Kareb River is surrounded by dense forest. It has been well preserved due to its inaccessibility as it is situated in a deep valley. The annual rainfall of the area around Mihur Eyessus monastery is 1300 mm with an annual mean temperature of 21^0C (Mihur and Aklil District Agricultural Office).

The total number of woody plant species recorded in the area was 83 representing 55 families of flowering plants and conifers; 50% were trees, 45% shrubs and 5% climbers. The six most abundant species were *Acanthus eminens, Garcinia buchananii, Podocarpus falcatus, Teclea nobilis, Myrsine africana* and *Maytenus arbutifolia*. The most aboundant shrubs were *Acanthus eminens, Teclea nobilis* and *Myrsine africana.* The climbers were represented by only 2 species, *Jasminum abyssinicum* and *Smilax aspera.* The monastery forest is dominated by *Podocarpus falcatus, Olea capensis* and *Syzygium guineense*. The understorey trees are *Garcinia buchananii* and a few trees of *Apodytes dimidiata*. The shrubs include *Teclea nobilis, Myrsine africana, Maytenus* spp. and *Acanthus eminens.* Tree species planted on monastery land include *Cupressus lucitanica, Eucalyptus globulus, Persea americana* and *Rhamnus priniodes.* The monastery forest is home for many wild animals. Among the common mammals are colobus monkey, vervet monkey, pig, bush back, rabbit, and porcupine.

Mihur Eyessus is one of the most ancient and historic monasteries in Ethiopia. It is believed by the monks that the monastery was established in 1358 by Abune Zena Markos. According to the informants, before the arrival of Abune Zena Markos, people of the area had worshipped in ancestral spirits called Makos and Gerdan. After the arrival of the monk some of the local people were converted to Christianity while some resisted and have been worshiping the sprits until the beginning of the 20th century.

During the times of the feudal kings between the 9 and 20th Centuries, there were plenty of forests in the area and no trees were cut in the monastery forest. When the population started to increasing, and the amount of land allocated to farming was getting smaller, the surrounding forests began to be destroyed. However, this did not affect the monastery forest. At that time the monastery forest was controlled by the sebekagubae (church council). The sebekagubae is made up of all community members. As a result, no member of the community cut any tree from the monastery forest for two reasons. The first is the belief systems associated with the forest: the monastery forest is believed by the local people to be inherited from their ancestors; it is the place for saints; it gives grace to the monastery building; it is a resting place for pilgrims; it is a symbol of the garden of Eden; and it is home for animals that are created by God. The second reason is the local rules and the bylaws that were used by the church council to punish anyone who breaks the rules: they usually meet at Jofor (the meeting place) to decide the amount of money levied on violators.

The monastery forest was valued by the local people as a source of wood to make coffins, shade during Jofor meetings and for its aesthetic value. The monastery forest also belonged to both the monks and the community. As a result, the monastery forest was preserved. The community and clergy used to jointly control the monastery forest. However, six years ago, the forest began to be controlled solely by the monks by the order of the Patriarch. Community control, access and use rights were removed. As a result, there is now a big conflict between the community and the monks. According to monk informants, they are using old and fallen *Juniperus procera* and *Podocarpus falcatus* trees to meet the wood requirement of the monastery. During the present study, the research team observed a lot of pit sawing activity inside the forest. In contrast to the disturbance created by natural tree falls, the areas where pit sawing has taken place are devoid of natural regeneration due to trampling and accumulation of sawdust.

v) Ziqualla Monastery

Ziqualla Gebre Menfes Kidus Abo is located 84 km south of Addis Ababa in the valley of the Awash River, which follows a semi-circular course around the base of Ziqualla Mountain from the west to the south. The monastery is at an altitude of 3000 m above sea level and its geographical location is 38^0 42'E and 38^{0}55'E longitude and 08^0 28'N to 8^{0}35' latitude. Ziqualla Mountain is almost cone shaped rising nearly one thousand meters from the surrounding plane. At the top is a circular crater, at the bottom of which (some hundred metres below the rim) is a crater lake. Many streams have their sources near the rim of the crater and they have eroded the land creating deep gullies on all sides of the mountain. Landslides are common.

The monastery forest is used as shelter for many wild animals such as bush duiker, klipspringer, golden jackal, leopard, aardvark, bushbuck, spotted hyaena, anubis baboon, vervet monkey, warthog, wild pig and colobus monkey. Bushbuck and klipspringer are

becoming rare because of hunting for meat. A few endemic bird species such as wattled ibis, abyssinian catbird, and thickbilled raven were observed during the plot study.

The total number of woody plant species recorded in the monastery forest was 56 representing at least 42 families of flowering plants and conifers. The six most abundant species were *Myrsine africana, Erica arborea, Juniperus procera, Galiniera saxifrage, Maytenus arbutifolia* and *Olea europea* ssp. *cuspidata*. The three most abundant trees were *Erica arborea, Juniperus procera* and *Olea europea* ssp. *cuspidata*. The most abundant shrubs were *Myrsine africana, Inulia confertiflora* and *Osyris lanceolata*, and climber *Smilax aspera*, while woody herbs were represented by *Acyranthus aspera* and *Lobelia giberroa* in the study plots. The most frequently encountered species was *Juniperus procera* (frequency = 100%) while the species with the highest tree density, *Myrsine africana*, had a frequency of 72%. Only 8 species occurred in more than 50% of the plots, indicating dominance by few species.

Ziqualla Gebre Menfes Kidus Abo was established by Abune Gebremenfes Kidus during the reign of king Lalibela in 1162. Gebremenfes Kidus was an Egyptian monk who arrived in Ethiopia to continue the work of evangelization initiated by 'The Nine Roman Saints' (Ayele Teklehaimanot, 1950). After the death of Gebremenfes Kidus, King Endrias who ruled Ethiopia in the 15th century built five churches in the monastery of Ziqualla. These were Medhane-Alem, St. Mary, St. Michael, St. Gabriel and Gebremenfes Kidus Abo. Between approximately 1527 and 1542 a Muslim leader, Ahmed Gragn, in an all-out jihad war destroyed many Orthodox churches. All the churches at Ziqualla were destroyed during this war. Then Emperor Menilik II rebuilt the monastery in 1880 using corrugated iron sheet roofing. The Monastery was again rebuilt in 1993. Since 1935, the government of Ethiopia started actively planting the area with many plant species such as *Pinus radiata* and *Cupressus lucitanica*. According to local informants Emperor Haile Sillasse played a significant role in the protection of the monastery forest by recruiting more than 100 soldiers. During the present regime, however, due to lack of a strong policy for sacred land forest protection, the surrounding community started expanding their agricultural land towards the summit of the mountain, and cutting trees for charcoal and fuel wood. In addition to forest destruction due to the increase in human population and livestock, fire is the major threat to the monastery forest. Much of the sacred land has been converted into grazing land by the nearby communities. The major threat is now the conflict between the monks and the community over the use of resources. Two of the eight local village communities (termed peasant associations (PAs)) are in strong conflict with the monastery over the use of the sacred land forests.

vi) Debre Benkol monastery

Debre Benkol monastery, in the highlands of Tigray, northern Ethiopia, is located 30 km from Axum town. It was established on the rocky flat top of Benkol Mountain. The foot of the mountain is at 2000 m a.s.l. whilst the top of the mountain rises to over 2650 m. Its geographical location is 38^0 37' E, and 14^0 11' N. The mean annual rainfall is 600 mm and the mean annual temperature is 21^0C. Both the mountain top and its slopes are believed to have once been covered with dense forest of *Olea europea* ssp. *cuspidata*, and *Juniperus procera*. Most of this forest has since been cleared to obtain fuelwood and other wood products. Today very few *Juniperus* and some *Olea* trees are left in the area surrounding the monastery. The whole slope of the mountain is covered with shrubs such

as *Dodonaea angustifolia, Calpurnia aurea, Acokanthera schimperi, Pterolobium stellatum, Teclea nobilis* and *Euclea schimperi*. Wood-cutting is still carried out by the people living in the monastery and residents of the surrounding area. The area of the monastery forest is now 56 ha. The forest is the major grazing land for livestock belonging to the monks and the surrounding residents. The forest is also rich in wild animals. Among the common mammals found are bush duiker, bushbuck, anubis baboon, other monkeys, aardvark, civet, serval, genet, and hyena.

44 woody plant species belonging to 27 families were recorded. *Olea europea* ssp. *cuspidata*, *Acacia etbacia*, *Acacia lahai* and *Rhus retinorrhoea* are the dominant woody species. Among the tree species endemic to the Afromontane floristic region, eight have been recorded as occurring in Ethiopia (Demel, 1996) and five of them were recorded in the site. In addition five other forms of Afromontane endemic plant species and four species of Afromontane near-endemics (Friis, 1992) have also been recorded. About 192 plant species have been reported to be threatened in Ethiopia (Ensermu et al., 1992). Among these, two species (*Juniperus procera* and *Rhus glutinosa*) were recorded in Debre Benkol monastery. Together with *Cordia africana* (protected by law), *Albizia amara* and *Olea europea* ssp. *cuspidata* (culturally highly valued), *Juniperus procera* and *Rhus retinorrhoea* were identified as threatened species of conservation importance for the area.

Using history and timeline study, it was found that Debre Benkol monastery was, and is still, a place of great religious importance to the Ethiopian Orthodox Tewahido Church. During the regime of Haile Sillasse it occupied a pre-eminent position as a source of religious people who teach Orthodox Christianity and its religious influence extended far beyond its own area into what now comprises the diocese of Debrelibanos Monastery in Shewa. The monastery used to occupy a very large land area given by emperor Haile Sillasse and previous emperors. It possessed a vast area of freehold land stretching from Axum in the East, to Shire in the West, Seraye in the North and to the Tekeze river in the south. The monastery then lost all the land it had acquired and was reduced to the current size of 56 ha of forest land as a result of the land proclamation of the Derg government which nationalised all land in Ethiopia in 1974. People started cutting the monastery forest intensively as a result of the cultural breakdown which occurred during the Derg regime and this has continued now due to the very loose land policy of the present government. When the monks were interviewed to find out whether they valued the monastery building more than the forest they said, “we value the monastery building but a church or a monastery without forest is like a human being without clothes”.

vii) Anchucho Medihanealem Church

Anchucho Medihanealem church is located 22 km south west of Sodo Town in Walaita Dawuro Zone of Southern Nation. It is situated on a flat land at an altitude of 1980 m. Its geographical location is 06^0 57’, 37^0 41’. Land surrounding the church is heavily populated to the extent that all cultivable land is under cereal crop cultivation. Due to shortage of grazing land, livestock of most of the farmers graze on cropland. The soil is heavy black vertisol and suffers from regular erosion. The mean annual rainfall is 1000 mm, and there are two rainy seasons, with three and four rainy months, respectively, March-May; July to October, with a peak in August. Mean annual temperature is 23^oC. Mean length of dry season(s) is 4 months (Arecha Agricultural Office)

Anchucho church forest is one of the few remnant dry afromontane forests in the region. The canopy tree species include *Podocarpus falcatus, Croton macrostachyus, Cordia africana, Allophylus abyssinicus, Dovyalis abyssinica* and *Albizia schimperiana.* Species of the shrub layer include *Carissa edulis, Maytenus arbutifolia, Myrsine africana, Capparis micrantha, Vernonia auriculifera* and *Vernonia leopoldii.* The Anchucho church forest is rich in highland biome birds.

According to the history and time line study, the history of Anchucho Medihanealem church dates back to one century. It was established in 1880 during the reign of emperor Menelik. The land, where the present church was founded, was once owned by private individuals. According to the informants, there was no Christianity at the time of Menelik. The king ordered one of his followers, Aba Tsgie to introduce Christianity to the area. Then the individuals who owned the land were made to give up their land for the establishment of the church building. At that time the area was densely forested with diverse tree species including bamboo. The church forest was highly diversified even during the reign of Emperor Haile Sillasse. Since the State and the church were strongly linked the people respected the church and its properties. Local people also planted trees around graveyards. The most common species planted were *Podocarpus falcatus, Prunus africana* and *Juniperus procera.* According to the informants, the tree species that are found today in the church yard are mostly planted by local people. As elsewhere in Ethiopia the Anchucho church forest was destroyed by Italian troops. After the fall of Emperor Haile Sillasse, a lot of damage to this church forest was done. Following the proclamation in 1974 of "land for tiller" the state and church were separated. The land, which belonged to the church was ex-appropriated and redistributed to landless peasants. The major threat to the church forest, according to informants, was the resettlement program around the forest. The number of followers of the Orthodox religion started to decline because of the introduction of protestant religion in the area. Although the followers of the protestant region had no direct effect on the church forest, the local people's perception about the sacredness of the church forest changed. The current land area, which belongs to the church is estimated to be 4 ha. 2 ha of this is covered by forest and rest by plantation and Euphorbia woodland.

The total of 51 species represented by 1018 individuals was recorded in the sample plots. Of the total 25 plots surveyed, 85% were under dense canopy. 15% was under medium canopy. All plots were with poor ground cover due to high level of browsing and grazing effect. The 51 species represented 35 families of flowering plants and conifers. Among the 51 species recorded, the six most abundant species were *Solanum schimperiana, Rytegynia neglecta, Clausena anisata, Teclea nobilis, Calpurnia aurea* and *Pittosporum abyssinica*. The most abundant shrubs were *Rytigynia negelecta, Teclea nobilis* and *Calpurnia aurea.* The climbers were represented by only one species, *Jasminum abyssinicum.* The most frequently encountered species was *Pittosporum abyssinica* (frequency =84%) followed by *Solanum schimperiana* (frequency = 24%). Only 6 species occurred in more than 50% of the plots, indicating the dominance of few species. The 51 species of woody plants recorded in all the study plots exhibited very unequal abundance. *Solanum schimperiana,* a shrub species accounted for 161 individuals which is 15.8% out of the total 1018 individuals recorded. The major trees represented by seedlings (height ≤ 1) were *Pittosporum abyssinica* and *Erythrina brucie*. Shrubs such as *Teclea nobilis* and *Maytenus spp.* were regenerating well.

4.1.3. Third Phase Study

4.1.3.1. Introduction

It was decided by the Darwin project team that the work of conservation plan development should prioritise sites with greater potential for success so that this would have the greatest potential to catalyse sacred forest conservation within the Ethiopian Tewahido Orthodox Church. It was also decided that the participatory development of conservation plans should involve as many relevant stakeholders as possible to maximise the success of future implementation of the plans. Based on the second phase data and personal observations, the Darwin project team, excluded two of the seven sites from the final phase activities, Debre Benkol and Anchucho Medihanealem Monasteries, as there was least local support for forest conservation in those two sites. Once the second phase field survey data were compiled and analysed, the Darwin project team went back to each of the final five selected focus sites to discuss with church and local community members the results of the data analysis and possible options for conservation that were aimed at facilitating local decision making which should define the final conservation plans and their implementation. The local communities' suggestions and knowledge were formally integrated to produce a draft proposal for conservation, which was presented, discussed and finally agreed amongst all the stakeholders, with additional recommendations, at the January 2004 final workshop. The proceedings of the final Workshop are now posted on the project website for public access http://www.safs.bangor.ac.uk/ethiopia.

4.1.3.2. Conservation recommendations

I. General recommendations

It is recommended that both the national and international priority conservation species (Table 3) and species that are highly valued by local communities (Table 4) are conserved and managed by applying the following recommended conservation and management techniques to increase the biodiversity of the sites and to provide tree resources to meet the multiple needs of the monasteries and churches and the surrounding communities.

i. Accelerated natural regeneration

For priority conservation tree species that are well represented by adult trees but with little or no regeneration, conditions for natural regeneration and persistence need to be provided on site. If overgrazing and trampling is a major problem at the site, exclusion of cattle and people is needed. This could be done by providing live fences by planting seedlings or cuttings of a local spiny tree or shrub species or erecting wooden fences to facilitate the establishment of these species by natural regeneration. Cultivation of the land to reduce compaction and promote seed germination is required.

ii. Protection and tending of naturally regenerating seedlings

For priority conservation tree species with good regeneration, protection of young individuals already present and tending them by thinning and weeding to maximize their growth rates to make seed sources more abundant, as a measure to enable sustainable use of the population, is recommended. Either planting a live fence of a local spiny tree or shrub or erecting a wooden fence in some sections of the forest where regeneration of these species is found, to protect young plants from grazing, is recommended. Some of the seedlings should be thinned and weeds removed at intervals to reduce competition.

iii. Enrichment planting

For priority conservation tree species with very rare adult trees and little or no regeneration, enrichment planting of nursery raised seedlings or cuttings is recommended. It is recommended that a nursery be established near a river or stream to ensure permanent water supply. Seeds and cuttings should be collected from the trees that are already present in the sacred land forest in order to preserve the unique biodiversity present. Clump planting of these trees in open spaces with least woody plant cover is recommended. Each clump should consist of a group of mixed seedlings/cuttings of all the priority conservation species (two per species) and be live-fenced by planting seedlings or cuttings of a local spiny tree or shrub or erecting wooden fence to protect the young seedlings from grazing. Two plants per species per clump are recommended as some of the species are dioecious (separate male and female plants).

iv. On farm plantations

It is recommended that communities living in and around the church or monastery yards participate in nursery activity and planting of the priority conservation tree species on their homesteads in order to increase the tree resources of the surrounding area and relieve pressure on the church or monastery forest.

II. Site specific recommendations

i) Debre Libanos Monastery

a) Priority species for conservation

In addition to the priority conservation species given in Tables 3 and 4, four woody species: *Milletia ferruginea***,** *Allophylus abyssinicus***,** *Ekebergia capensis***,** *Osyris lanceolata* that were identified as being well represented by both potential seed sources and abundant regeneration are recommended to be conserved and managed to increase their utility values.

Milletia ferruginea- nitrogen fixing for soil enrichment, shade, fuelwood and fodder, easily propagated from seed

Allophylus abyssinicus –shade, medicine, fuelwood and charcoal, bee forage, roots for medicine

Ekebergia capensis- fodder, good forage for bees, fuelwood and charcoal, tannin, medicine, erosion control, useful shade, fast growing tree (1m year^{-1}), easily propagated from fresh seeds

Osyris lanceolata - African sandalwood, santalol (sandalwood oil) extracted from wood and root, easily propagated from seeds and cuttings.

b) Accelerated natural regeneration

Accelerated natural regeneration is recommended for *Olea europea*, *Juniperus procera*, *Carissa edulis* and *Osyris lanceolata* as these tree species are well represented by adult trees but with little or no regeneration.

c) Protection and tending of naturally regenerating seedlings

It is recommended that regenerating seedlings of *Prunus africana, Milletia ferruginea, Allophylus abyssinicus* and *Ekebergia capensis* are protected as these tree species were

found to be regenerating very well in the forest.

d) Enrichment planting

Enrichment planting of nursery raised seedlings or cuttings is recommended for *Acacia abyssinica, Podocarpus falcatus, Cordia african, Ficus sur, Maytenus arbutifolia, Rhus glutinosa, Dombeya torrida,* and *Schefflera abyssinica,* as these tree species are with very rare adult trees and little or no regeneration. It is recommended that a nursery be established near the River Enkurkurit. The most appropriate planting sites could be Bahatawi, Betheselom and around graves. It is also recommended that the monastery draws up a contract with each family wanting to bury their relatives by making them agree to plant and look after (guard) the above species around each grave.

e) Additional recommendations

Establishment of fuelwood plantation and providing alternative sources of fuel such as solar energy, electricity and biogas should be considered to help reduce pressure on the forest.

ii) Geja Georgis Church

a) Restoration

The church represents the most degraded sacred site of this set of five focus sites. All the species found in the church land are poorly represented by adult trees with little or no regeneration. Thus, more active restoration of the existing indigenous species (Tables 3 and 4) and introduction of other indigenous species of national conservation priority is recommended. According to the local informants, they are interested in introducing the following additional national priority conservation species to the site: *Prunus Africana, Podocarpus falcatus* and *Cordia africana*. Seedlings of these species and the other local indigenous species (Tables 3 and 4) are recommended to be raised in a nursery to be established near Endod River by the clergy in collaboration with the surrounding community members and planted in clumps in the church forest and surrounding areas.

b) Additional recommendations

Past difficulties with seedling establishment can be overcome with the provision of information about different planting techniques. Soil and water conservation measures are important for the site. Spring development is required to overcome problems with seasonal water supply. Education and awareness raising by the church to explain to local communities the importance of trees are needed. Education and awareness should also be taken to schools and clubs. Support from local organisations should continue.

iii) Aba Asrat Monastery

a) Conflict resolution

Three distinct forest entities were identified around Aba Asrat monastery in accordance with the location and current utilisation pattern of the resources: Aba Asrat monastery forest, Malbar forest and Enechifo forest. As judged by the current status of these forests, all of them are heavily degraded, with Malbar and Enechifo forests being most degraded. The monastery is surrounded by nine peasant associations (PAs) that are extremely dependent on these forests, with more pressure being exerted on the monastery forest than the others as the other two are already degraded. As a result there is conflict between

the monastery and the surrounding communities, in particular with forest-product-based livelihood groups (fuel wood and charcoal producers for Debre Makcos market). In order to resolve the current conflict and restore and sustainably manage these forests, it is recommended that responsibility for the restoration and management and ownership of each forest be given to one group or set of groups depending on their proximity to and dependence on the forest. It is therefore recommended that the restoration and management of Aba Asrat monastery forest be the responsibility of the clergy and it be owned and utilised solely by the monastery, Malbar forest by Chemoga 1, Chemochel, Gugim and Yekuata PAs, and Enechifo forest by Chemoga 2, Foket, Bulched, Chifrg and Wuhasar PAs. It is also recommended that rules and bylaws governing all the above be agreed by all parties (the monastery and the surrounding communities), approved by local administration authorities, and introduced.

It is further recommended that awareness raising for all surrounding resource users and this should start with graziers (free grazing). Ways to continue and strengthen relationship with 2 PAs already interested in participatory resource management must be found. Woreda must be approached as a way to build relationship with remaining 7 PAs. Link awareness and communication to planting of live fence to manage grazing in monastery forest is needed.

b) Accelerated natural regeneration

Conditions for natural regeneration and persistence is recommended to be provided for the following tree species which are well represented by potential seed sources, but with little or no regeneration: *Albizia schimperiana, Apodytes dimidiata, Allophylus abyssinicus, Rhus glutinosa, Myrica salicifolia, Clausena anisata, Teclea nobis* and *Carissa edulis*. According to the clergy approx. 1/3 of the monastery area can be turned to natural regeneration. Stone-walls to close entrance to these patches of the monastery forest is also recommended.

c) Enrichment planting

Enrichment planting of nursery raised seedlings or cuttings is recommended for the following tree species with very rare adult individuals and little or no regeneration: *Olea europea, Juniperus procera, Albizia gumífera, Acacia abyssinica, Acacia nilotica, Prunus africana, Ficus sur, Dombeya aethiopica,* and *Schefflera abyssinica*. A single central nursery jointly managed by the monastery and the surrounding communities is recommended to be established near the River Chemoga.

d) Additional recommendations

Alternative energy source should be identified and implemented to reduce the dependency on fuel wood or increase the efficiency of fuel wood use. Boundary demarcation of the monastery forest should be given priority. The conservation of non-woody species should also be considered.

iv) Mihur Eyessus Monastery

a) Conflict resolution

The monastery forest currently seems to be well preserved as a result of the local community's strong spiritual value attached to the forest, the existence of local community rules and bylaws to punish anyone who cuts trees in the monastery forest, and

the community practice of agroforestry that does not require expansion of cropland. The community and monks jointly controlled the monastery forest until recently. However, now, the local community has been excluded from exercising control on the forest and has also been denied access. Although this exclusion has not yet had any impact on the forest, it may have negative consequences in the future. Tension between the community and the clergy is already rising. It is therefore recommended that the monks consider restoring its relationship with the community so that the cultural value of the forest held by the community and their access to the forest are revived. These could be achieved by allowing the community to continue to use the forest subject to the local rules and bylaws to protect the forest, and jointly restoring and creating a communal forest resource on the degraded areas surrounding the monastery forest.

b) Accelerated natural regeneration and enrichment planting

For the priority conservation tree species (Tables 3 and 4) that are represented in the monastery forest by potential seed sources but with little or no regeneration: *Juniperus procera, Olea europea*, *Prunus africana*, *Olea capensis*, *Phoenix reclinata***,** *Syzygium guineense* and *Olinia rochetiana*, conditions for natural regeneration and persistence is recommended to be provided on site. Sawdust from pit sawing, woody debris from fallen trees and soil compaction by pit sawing activities are reported to hinder regeneration in the gaps created by fallen trees. Collecting and piling the sawdust and debris to one side in the forest and cultivation of the cleared land to reduce compaction are needed to promote seed germination and facilitate the establishment of these species by natural regeneration. For the tree species that are regenerating abundantly, *Podocarpus falcatus* and *Garcinia buchananii*, wildings could be collected and planted wherever there are gaps in the forest. This could be carried out entirely by the monks.

c) Restoration of degraded forests surrounding the monastery forest

It is recommended that the degraded areas, surrounding the monastery forest, be restored by planting nursery-raised seedlings or cuttings of all the above seven priority conservation tree species. These forests should be managed jointly and utilised by both the monks and the surrounding communities. For tree species that are represented in the monastery forest by abundant regeneration (*Podocarpus falcatus* and *Garcinia buchananii*) wildings collected from the monastery forest could be used for planting. A single central nursery jointly managed by the monastery and the surrounding communities is recommended to be established near the River Boqiya.

v) Ziqualla Monastery

a) Conflict resolution

The monastery forest currently seems to be under threat by encroachment, excessive cutting, fire and overgrazing. Tension between the communities and the monks is already rising. Currently, around 10 armed monks are guarding the monastery forest against members of the 8 PAs surrounding it. This is, however, not sustainable and, instead, the co-operation of the local communities is essential. It is therefore recommended that the monks consider restoring their relationships with the surrounding communities and reinforcing the liturgical approach to monastery forest conservation. The monks must teach the faithful the usefulness of preserving the monastery forests by placing more emphasis on the sacred and aesthetic values of the monastery forests that are found in Chichisa, Tsebel-meda, Arb-erob and Medhanealem and encourage the surrounding

communities to feel responsibility to care for these forests. This could be achieved by forming a joint committee for monastery forest conservation and management consisting of representatives of the monastery and the surrounding 8 PAs. Local bylaws and fines may need to be introduced to reinforce the liturgical-based incentive to protect these remnant monastery forests. The committee should also be made responsible for restoring and creating a communal forest resource on the degraded areas surrounding the monastery forest. This is where the local administration and the office of the Ethiopian Orthodox Tewahido Church could play a significant role by calling meetings where these could be discussed, the above committee be formed and local rules and bylaws and fines be agreed. The committee would then be empowered with the authority to implement the actions and enforce the bylaws and fines.

b) Priority species for conservation

In addition to the priority conservation species given in Tables 3 and 4, *Osyris lanceolata* (African sandalwood), which is also present in the monastery forest, is recommended to be given priority for conservation and management to increase its utility value.

c) Accelerated natural regeneration and enrichment planting

For priority conservation tree species that are well represented in the monastery forest by potential seed sources but with little or no regeneration (*Juniperus procera, Olea europea, Hagenia abyssinica, Rhus glutinosa, Osyris lanceolata* and *Olinia rochetiana*), it is recommended that conditions for natural regeneration of these species be provided on-site. For tree species that are regenerating well (*Juniperus procera* and *Olea europea*) wildings could be collected and planted within these gaps and patches. This could be carried out entirely by the monks.

d) Restoration of degraded forests surrounding the monastery forest

Three areas are identified for restoration: (1) areas where horticulture is practiced, (2) middle and lower slope areas and (3) buffer zone around the mountain. For the horticultural areas soil and water conservation measures are recommended as priority. Terraces, soil bunds, etc. should be considered for adoption. Restoration of middle and lower areas should be carried out by government who should enter into discussions about management with surrounding PAs and the monastery. For the buffer zone areas surrounding the monastery forests, it is recommended that the degraded areas be restored by planting nursery raised seedlings or cuttings of priority conservation tree species: *Juniperus procera, Olea europea, Hagenia abyssinica, Rhus glutinosa, Osyris lanceolata, Olinia rochetiana, Mimusops kummel, Acacia gerrardii, Protea gaguedi, Grewia bicolor, Brucea antidysenterica, Premna resinosa and Euclea schimperi* to create a communal forest resource to meet the multiple tree product needs of the monastery and the surrounding communities. In addition to the indigenous trees a mixture of high yielding and fast growing and drought tolerant fuelwood species is recommended. These forests are to be managed by the above committee and utilised by both the monks and the surrounding communities. Three nurseries are recommended to be established in three locations with permanent water supply. One nursery for upland areas and two nurseries for lower areas are recommended.

e) Additional recommendations

Rainwater harvesting from roofs should be implemented, monastery ponds should be built to store water and sinking wells to tap freshwater should be implemented to increase

availability of water in the area. Wildlife conservation should also be given thought.

References

1) Ayele Teklehaimanot (1950). Ethiopian Review of Cultures. Capuchin Franciscan Institute of Philosophy and Theology.
2) Demel Teketay (1996). Seed ecology and regeneration in dry afromontone forest of Ethiopia. Doctoral thesis. Swedish University of Agricultural Sciences, Umea, Sweden.
3) Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu and Sue Edward (1992). Some threatened endemic plants of Ethiopia. In. Sue Edward & Zemede Asfaw, (eds), The Status of Some Plant Resources in Parts of Tropical Africa. Botany 2000: East and centeral Africa. NAPRECA Monograph Series No. 2. NAPRECA, Addis Ababa University, Addis Ababa: 35-55.
4) Friis, I (1992). Forest and forest trees of north east tropical Africa. HMSO, Kew Bulletin Additional Series XV. 396pp.
5) IBCR (2003). National priority conservation species of Ethiopia. Unpublished Working Document, Addis Ababa.
6) Lovett, J. C. and I. Friis (1996). Patterns of endemism in the woody flora of north-east and east Africa. Pages 582-601 in L. J. G. van der Maesen, X. M. van der Burgt, J. M. van Medenbach de Rooy, editors. The Biodiversity of African Plants. The Netherlands: Kluwer Academic Publishers.
7) Teketay D. and Bekele T. (1995) Floristic composition of Wof-Washa natural forest, Central Ethiopia: Implications for the conservation of biodiversity, Feddes Repertorium, 106:127-147.
8) WCMC (World Conservation Monitoring Center) (1996). Guidelines for the application of the 1994 IUCN Red list Categories to trees. 17pp. Downloaded from http://www.wcmc.org.uk/trees/iucn_cats.htm
9) White, F. (1983). The vegetation of Africa, a descriptive memoir to accompany the UNESCO/AETFAT/UNSO Vegetation Map of Africa (3 Plates, Northwestern Africa, Northeastern Africa, and Southern Africa, 1:5,000,000). UNESCO, Paris.

4.2. Training and capacity building activities

From early in the work of the project it was decided to make the stakeholders at grass root level (clergy and local communities) prime targets for capacity building activities in order to empower them to successfully implement the conservation of biodiversity around church and monastery yards. The use of the properly designed participatory techniques by the project helped to provide enlightening and informative orientations, which stimulated group discussions and interactive learning to members of the church, monastery and local communities throughout the three phases of the project. As a result of these interactions, their knowledge, confidence and capacity have been increased. 339 members of the church, monastery and local communities from 38 sites participated in the first phase fieldwork activities, 145 members from 7 sites during the second phase and 125 members from 5 sites during the third or final phase. The local Peasant Association leaders selected the local community members while the church and monastery leaders selected the knowledgeable clergies and monks, respectively. They were selected based on their knowledge and interest in the church and monastery forests.

Equally important was the capacity strengthening of government institutions concerned

with biodiversity conservation in Ethiopia. The three project workshops provided platform for knowledge sharing among these institutions, interaction with the project and capacity building through the establishment of a collaborative network. 18 participants from a broad range of the government, educational and non-governmental organisations in Ethiopia attended the two days workshops in August 2001 and January 2004. Organisations represented at the workshops included: Environmental Protection Authority, Ethiopian Orthodox Tewahido Church, Ethiopian Agriculture Research Organization, Ethiopian Wildlife Conservation Organization, Ministry of Agriculture, Addis Ababa University, Institute of Biodiversity Conservation and Research and Ethiopian Wildlife and Natural History Society. In addition 10 representatives from church, monastery and local communities participated in the final workshop in January 2004. A training workshop was also conducted in Addis Ababa on 26th April 2002 for 15 participants from the same government, educational and non-governmental organisations mentioned above. The participants were selected by each organisation and they were staff who would benefit most from the training. The one-day workshop included indoor and field exercises. The field exercise was conducted in Chancho Egzihabiher Ab Church located 20 km north of Addis Ababa. The participants were briefed on the situations that the various monasteries and churches are facing, which were extensively discussed. Training was provided in rapid biodiversity assessment and participatory appraisal and conservation management planning appropriate to the complex environmental, institutional and social context of church and monastery forests.

The following training activities were conducted to strengthen the capacity of EWNHS, the project partner organisation. During October (two weeks) and November 2001 (two weeks) six staff members from the EWNHS were trained in plant and vertebrate identification techniques. They were selected by EWNHS because they were staff who would benefit most from the training, and had most need to use these techniques in their professional responsibilities. The two Darwin project staff employed by the EWNHS received on-the-job training on various aspects of landscape, vegetation and population ecology, PRA, interview techniques and techniques of in-situ and ex-situ biodiversity conservation in 2001, 2002 and 2003. In January 2003, the two project staff from EWNHS were given in-depth training in Social Participatory Appraisal (SPA) and plant inventory techniques. This was carried out for three weeks by the UWB expert, Bianca Ambrose-Oji, and included fieldwork in the Chancho area, focusing on the Egzihabiher Ab church. The training was comprehensive and included: nature of participation, research objectives and questions, developing and testing protocols, resources, recording sheets and data collection, process tracking, data analysis and recording, sampling and the potential for quantitative analysis, reactions to the suggested PRA techniques, time lines, investigation of cultural and symbolic significance, social maps, tenure maps, mapping power, transect walks with classification of landscape and vegetation, focus groups, seasonal calendars, semi-structured interviews, venn diagrams, matrix ranking or scoring, data handling, data analysis with values tables and stakeholder analysis, qualitative data analysis, external and internal reliability of data, reporting, participatory biodiversity management planning. This training included the production of three training documents: (1) Ambrose-Oji, B., Dessisa, D., Adane, G. (2003), Social Research Data Collection and Summary Protocol, 57 pp, (2) Ambrose-Oji, B. (2002), Guidelines on social elements of sacred-land forest conservation, 18 pp, and (3) Ambrose-Oji, B. (2003), Training materials, with refined research objectives, questions and protocols, 100 pp.

5. Project Impacts

From early in the work of the project it became clear that influencing the attitude of the Ethiopian Orthodox Tewahido Church at local, diocese and headquarters levels, to biodiversity conservation was a prerequisite for successful achievement of the project purpose. This required not just development of attitudes to conservation itself, but also a willingness to develop new forms of compromise and collaboration with local communities to bring this about. Because of the complexity of the church as an institution, and the interaction between its different levels, this has been a difficult task to achieve that has required much patience. After three years the project has clearly had an important impact on the church as an institution; central support for active, participatory biodiversity conservation in its sacred sites is now much more evident and monks and priests in the project's focus sites are now far more empowered with the knowledge and confidence to adopt ecologically based approaches to forest restoration (as opposed to the previously conventional exotic species plantation forestry techniques) in close collaboration with members of their local communities.

The forests around church and monastery yards were previously managed jointly by the community and the clergy. This, however, appears to have changed recently and there have been conflicts between the clergy and the community. As a result of Darwin project two of the five focus sites, Aba Asrat and Mihur Eyessus monasteries, have been able to resolve their internal conflicts. This is one evidence of the current impact of the Darwin project on the attitudes of the church and local communities.

Much effort has also been spent promoting the Darwin project within Ethiopia among government and non-government organisations. The Darwin project has, therefore, had impact on the awareness of many Ethiopians about the current status of biodiversity and the threats around church and monastery not only within the church but also within government and non-government organisations in Ethiopia. The formation of a collaborative network of government and non-government institutions concerned with church and monastery forest biodiversity was a direct impact of the project's effort.

Whilst national and local government support for this initiative has been vital, a key component has been the strengthening of the capacity of the EWNHS (as a widely respected NGO) to play a key role as a source of technical advice to local stakeholders in this work. EWNHS has greatly benefited from the inputs provided by the Darwin Initiative project. EWNHS is now capable of undertaking similar activities by themselves. The project has developed strong links between the EWNHS in, not only the five focus sites, but also the 38 church and monastery sites that were included in the phase 1 work. The project has thus created the conditions from which a major acceleration of church and monastery forest restoration and biodiversity conservation could now accelerate from these exemplar sites. However, this will require further external support to meet the modest costs of this work over the years ahead if this prospect is to be realised.

The project has, therefore, made contributions towards Ethiopia meeting its obligation under CBD, more specifically Articles 6, 7, 8, 9, 10, 12 and 17 both now and in the future.

6. Project Outputs

The project outputs are provided in Appendix II. One of the major research outputs of the project is the data-base establishment of 230 reference collections of woody species recorded in the 38 sites. As a result of the second phase work, a data-base providing generic information on biodiversity status of the seven focus sites has also been established. Conservation plans developed based on local people's participation for five of the seven focus sites was also another major research output of the project's final phase.

The production of one paper, which has been published in peer reviewed journal, one article in the proceedings of 8th International Congress of the International Society of Ethnobiology (ISE), USA and one article in the newsletter of European Tropical Forest Research Network (ETFRN), the Netherlands was also another major research output of the project and these are shown in Appendix III. Two papers are under preparation for submission to international referred journals.

Through training and capacity building activities, knowledge and capacity of a total of 609 church and local community members and 33 representatives of government and non-government organisations was increased as a result of interactions with the project during the participatory appraisal fieldwork and the project workshops. This is an additional output of the project, which was not shown in the agreed schedule. With regard to capacity building of EWNHS, two Darwin project workers received on job training in various aspects of biodiversity assessment and conservation throughout the three years period. In addition six staff members from the EWNHS received training in plant and vertebrate identification. A one-day training workshop was also conducted for 15 participants from various government and non-government institutions in Ethiopia. They received training on rapid biodiversity assessment and participatory appraisal and conservation management planning. These are given in Appendix II under training outputs.

Two activities in the agreed schedule, which were either not or were partially achieved included the press releases (partially achieved) and establishment of the Ex-situ Conservation Centre (not achieved) (Appendix II).

The top priority of the project has been to influence attitudes to church and monastery forest conservation within the church, at all levels from the headquarters, through dioceses to individual churches and monasteries. The project came to recognise how complex an organisation the church is and how politically sensitive the objective was. It became clear that publicity in the press (printed or broadcast), that might in any way be construed as a criticism of the church's current management of sacred land forests could jeopardise the success of the project and have an adverse impact on its purposes and goals. Therefore, the project was forced to curtail its original plans for publicity in Ethiopia. As a consequence of this, and the large exiled Ethiopian populations in UK and other countries, it was also necessary to avoid any press coverage in the UK, which might well be reported back to Ethiopia.

In order to keep key professional stakeholders in Ethiopia and elsewhere informed of the work of the project, we decided to use the newsletter of EWNHS to publish a series of articles on the progress of the project. The newsletter has a circulation of over 2500 in Ethiopia and over 25 worldwide and this is shown in Appendix II.

The project web site has also been set up for information dissemination relating to project outputs and outcomes and this is a major significant output of the Darwin project. The new project web site, which is both in English and Amharic (the national language of Ethiopia), is regularly being updated http://www.safs.bangor.ac.uk/ethiopia. All the baseline data, proceedings of workshops and sacred land forest conservations plans are placed on the web site for long-term public access. All government and non-government organisations in Ethiopia and the Ethiopian Orthodox Tewahido Church at the headquarters have good access to WWW, which is provided by the Ethiopian Telecommunication.

Reflective analysis of the results of phase 1 and 2 of the project made it clear that the original plan (which had been promoted by the EWNHS for a high-profile centrally-located ex-situ conservation centre to be built in phase 3, would not be suitable to meet the project's goals or objectives. The project results showed that supplying planting material to the individual church and monastery sites located across the Ethiopian highlands over distance from a single centre would not be practical. Also it would contradict the ethos that emerged within the project of empowering the local stakeholders at each site to take control of all stages of the forest restoration process (from seed collection, propagation, planting and protection). Therefore, in place of establishing an ex-situ conservation centre the project used its resources to promote the planning of nurseries to be established by the local priests, monks and community at each site.

7. Project Expenditure

3rd Year Expenditure

Category	Budget	Actual	Variance
	£.P	£.P	£.P

N.B. The under-spend has resulted in our Ethiopian partners from not spending their full budget.

Expenditure for full three years of project

	Budget	Agreed Budget Transfer (includes overspend year 2)	Amended Budget*	Actual	Variance
	£.P	£.P	£.P	£.P	£.P

* This was approved by the secretariat of the Darwin Initiative, DEFRA

8. Project Operation and Partnerships

In the agreed schedule the local project partners were: Biodiversity Conservation and Research (IBCR) and Ethiopian Wildlife and Natural History Society (EWNHS). Due to local administrative hurdles in Ethiopia, IBCR could not participate directly in the project. They informed us that they could not officially sign the project schedule document and proceed with its implementation but they were fully committed to support EWNHS. This was reported to the Darwin Secretariat at the time (07/09/01) and it was agreed (21/09/01) to transfer the financial channel from IBCR to EWNHS and the participation of IBCR be channelled via EWNHS.

EWNHS was, therefore, the main partner in the Darwin Initiative project. EWNHS is a membership-based, indigenous, non-governmental and non-profit making organization concerned with awareness-creation and wise and sustainable use of Ethiopia's natural resources and the protection of the environment. The Society is registered with the Ministry of Justice of the Ethiopian Government. It was established in 1966. EWNHS is the oldest organization outside the government to advocate the conservation and wise use of Ethiopia's environment and natural resources. Its objectives are to assist national efforts to conserve and develop the flora and fauna, and to protect the environment, in its totality, for the benefit of present and future generations; to conduct, participate in, promote and support research on Ethiopia's flora, fauna and on the environment, and to disseminate information on the same; to establish an information center and disseminate information to provide environmental education, and to create an awareness of the need for the conservation of Ethiopia's natural resources, and for protecting the environment; undertake, promote and encourage conservation and management activities in key biodiversity sites. The Society publishes an annual scientific journal 'WALIA', and a quarterly newsletter (over 2500 copies circulated), both of which have readers throughout Ethiopia and worldwide. Through a two-year project on biodiversity conservation research funded by Bird Life International, it has published the book 'Important bird areas of Ethiopia: the first inventory' which is the first bird areas directory to be published in Africa.

Although EWNHS was the main local partner in the project, IBCR, Environmental Protection Authority, Ethiopian Orthodox Tewahido Church Development Agency, Ethiopian Agriculture Research Organization, Ethiopian Wildlife Conservation Organization, Ministry of Agriculture, Addis Ababa University, Forest Research Centre, and National Tree Seeds Project participated in the project as members of the collaborative network both through workshops and fieldwork. In addition to the local organisations, UNDP was also actively involved in the collaborative networking.

IBCR is the government Biodiversity Strategy (BS) Office for Ethiopia while EWNHS is a non-government organisation set up to assist national efforts to conserve and develop the flora and fauna, and to protect the environment of Ethiopia. Thus, EWNHS and IBCR have been working together very closely even before the Darwin project. The current Darwin project has greatly enhanced their relationship.

9. Monitoring and Evaluation, Lesson learning

The influencing/strengthening of key institutions within a complex cultural and political context, cannot be held subject to rigid project frameworks. Therefore, the monitoring and evaluation of such a project requires long-term continuity and commitment.

Nevertheless, there have been important milestones in the project design such the participatory biodiversity appraisal and the generation of the biophysical and socio-economic data on church and monastery forest biodiversity. This is the first attempt in the country to generate such comprehensive information on the biodiversity status of church and monastery forests and the threats that they are under and conservation plans which will serve as models for conserving the biodiversity present around all church and monastery yards throughout Ethiopia. All this information is now placed on the project web site hosted by the University of Wales Bangor server for free access. The information will serve as a useful tool for research, education and development in the country and the biodiversity conservation plans, if successfully implemented, will have significant effect on conservation of the biodiversity around church and monastery yards. Since a long-term link in the form of a collaborative network between institutions in Ethiopia and the University of Wales Bangor has now been established, and the data generated by the project are made accessible to everyone through the web site which will be regularly updated with new information sent from network members, the long-term impact of the Darwin project could easily be monitored and evaluated.

Throughout the three years, the Darwin project encountered a number of logistical, financial and administration problems, from which a great deal has been learnt. The major constraint was the limited budget provided for an ambitious project. This resulted in the purchase of a vehicle not suited to the amount of fieldwork envisaged. The amount of labour required for fieldwork could not be fully met. Future projects should therefore ensure that project activities are commensurable with the budget allocated before embarking upon field activities. Otherwise, projects should be allowed to cut down project activities if in the course of the project it is found that the budget is inadequate to meet the agreed project schedule. The administrative hurdles in terms of bureaucratic procedures that projects have to endure in developing countries to obtain permits, etc. should also be taken into account in timetabling project activities in future projects.

10. Darwin Identity:

Several efforts have been made to publicise the Darwin Initiative. All the 38 church, monastery and local community members contacted are now familiar with the Darwin Initiative programme. At the three project workshops the objectives of the Darwin Initiative and funding opportunities have been promoted to participants representing various government and non-government organisations. The project vehicle always carried the Darwin Initiative logo to promote the initiative to the wider public. The EWNHS newsletters have also been used for the same purpose. IBCR, the major institution with a mandate for conservation and management of the country's biodiversity, was a key partner in this project. As a result, they are now familiar with the Darwin Initiative.

11. Leverage

Following the Darwin project initiative, EWNHS was able to capture additional funds from the French Embassy in Addis Ababa for similar work in 6 churches around Addis Ababa.

The UK project staff established contact with the British Embassy in Addis Ababa to solicit similar funds. The British Embassy was invited to officially close the final workshop in January 2004, to which they agreed in writing. However, no one from the Embassy turned up at the closing ceremony. Instead we had to invite a participant from the workshop to close the workshop. This was an embarrassing situation, which was caused by our own Embassy and no apology has yet been received.

12. Sustainability and Legacy

The Darwin project is the only project in Ethiopia which has examined in detail the biodiversity status of church and monastery yards throughout the country and provided options for conserving this through local community participation. These project achievements are likely to endure and to have impacts on the biodiversity of the country. EWNHS, an indigenous NGO with a major role in the management and conservation of the indigenous flora and fauna of Ethiopia, will certainly continue to solicit additional funds to apply the results of the Darwin project. They are, however, unlikely to succeed given the current competitive funding environment worldwide.

13. Post-Project Follow up Activities *(max. 300 words)*

At the final project workshop, where, in addition to representatives of government and non-government organisations, 10 participants representing the clergy and the local communities attended, a lot of time was spent discussing the implementation of the results of the Darwin project, in particular, the conservation plans. Lack of funds was raised as a major constraint. A large proportion of the Ethiopian population is living under conditions of extreme poverty and food insecurity. Church and monastery communities are strongly affected by these. Therefore, the clergy and local community members have much more pressing priorities at the present moment despite their commitment to continue to conserve the existing biodiversity which they have maintained for many generations up to now. Therefore, we request that the Darwin Initiative secretariat consider the implementation of the conservation plans at the five focus sites for post-project funding in order to embed the results of the project in the

church, the EWNHS and local communities, as they all lack the necessary financial resources to achieve these themselves.

14. Value for money

Despite the tight project budget, the achievement made by the project is tremendous and extremely valued by various stakeholders and institutions in Ethiopia. The General Manager of the Ethiopian Orthodox Tewahido Church praised the project team by stating that the conservation plans produced by the project will serve as models for other church and monastery forests.

Author(s): This report was authored by Zewge Teklehaimanot with editorial input by John Healey

Date: 28 June 2004

Appendix I: Project Contribution to Articles under the Convention on Biological Diversity (CBD)

Project Contribution to Articles under the Convention on Biological Diversity		
Article No./Title	**Project %**	**Article Description**
6. General Measures for Conservation & Sustainable Use	5	Develop national strategies which integrate conservation and sustainable use.
7. Identification and Monitoring	20	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities which have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	20	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation	5	Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity	20	Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	20	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness		Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.

14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information	10	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Total %	**100%**	**Check % = total 100**

Appendix II Outputs

Code	Total to date (reduce box)	Detail (←expand box)
Training Outputs		
5	Number of people receiving other forms of **long-term** (>1yr) training not leading to formal qualification(i.e not categories 1-4 above)	2 Darwin project workers from EWNHS received on job training in various aspects of biodiversity assessment and conservation over the three years 2001-2003/4.
6a	Number of people receiving other forms of **short-term** education/training (i.e. not categories 1-5 above)	In 2001 six staff members from the EWNHS were trained in plant and vertebrate identification (4 weeks), a one-day training workshop was conducted in 2002 for 15 participants from various government institutions in Ethiopia.
6b	Number of training weeks not leading to formal qualification	5 weeks
Research Outputs		
8	Number of weeks spent by UK project staff on project work in host country(s)	138 weeks (project officer (104), principal investigator (24), co-principal investigator (4), two members of UWB (6) and one member of ARC (2)
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	5 conservation plans for five selected focus church and monastery forests
11a	Number of papers published or accepted for publication in peer reviewed journals	1 paper published in peer reviewed journal WALIA in 2003, Vol 23, pp 42-48.
11b	Number of papers published or accepted for publication elsewhere	2 papers published: 1) in the proceedings of 8th International Congress of the International Society of Ethnobiology (ISE) and 2) newsletter of European Tropical Forest Research Network (ETFRN).
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	2 data bases: 1) profile of 38 sites, 2) generic information on biodiversity status of seven focus sites
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	The above 2 data bases have been enhanced with additional information
13a	Number of species reference collections established and handed over to host country(s)	230 reference collections of woody species established and handed over to host country

Code	Total to date (reduce box)	Detail (←expand box)
13b	Number of species reference collections enhanced and handed over to host country(s)	The above reference collections have been enhanced with additional information

Dissemination Outputs		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	3 workshops held in Addis Ababa: planning workshop in 2001, training workshop in 2002 and final workshop in January 2004.
14b	Number of conferences/seminars/ workshops **attended** at which findings from Darwin project work will be presented/ disseminated.	8th International Congress of the International Society of Ethnobiology (ISE) held in Addis Ababa, 16-18 September 2002
15a	Number of national press releases or publicity articles in host country(s)	4 publicity articles published in EWNHS newsletters: March 2002, March 2002, March 2003 and September 2003
16a	Number of issues of newsletters produced in the host country(s)	Front page of one issue of EWNHS newsletter devoted to the project, June 2001
16b	Estimated circulation of each newsletter in the host country(s)	2500
16c	Estimated circulation of each newsletter in the UK and other countries	25
17a	Number of dissemination networks established	One project web site http://www.safs.bangor.ac.uk/ethiopia set up and running
17b	Number of dissemination networks enhanced or extended	The above web site is regularly updated.
Physical Outputs		
20	Estimated value (£s) of physical assets handed over to host country(s)	A vehicle with value of £17,000 handed over to host country
23	Value of additional resources raised for project	Value of other resources raised £95,591

Appendix III: Publications

Mark (*) all publications and other material that you have included with this report

Type * (e.g. journal paper, book, manual, CD)	Detail (e.g. title, authors, journal, year, pages)	Publishers (name, city)	Available from (e.g. contact address, email address, website)	Cost £
Proceedings*	Proceedings of the first planning workshop on biodiversity conservation in ancient church and monastery yards in Ethiopia, UWB (2001), 32pp.	University of Wales Bangor, UK	http://members.lycos.co.uk/ethiopianplants/sacredgrove/	Free
MSc Dissertation*	Biodiversity in Kondaltiti Balewold Church forest and its environs, South Western Ethiopia, Matthew Painton (2002), 141pp.	University of Wales Bangor, UK	University of Wales Bangor, UK	Free
Newsletter article*	Rapid biodiversity assessment, EWNHS, Newsletter of the EWNHS Jan.-March (2002), p3.	EWNHS, Addis Ababa, Ethiopia	EWNHS PO Box 13303 Addis Ababa Ethiopia	Free
Newsletter article*	Aba Hailegebresilasse - Lalibela's tree planting monk, Desalegn Desissa, P. Binggeli & J. Smith, Newsletter of the EWNHS Jan.-March (2002), pp4-6.	EWNHS, Addis Ababa, Ethiopia	EWNHS PO Box 13303 Addis Ababa Ethiopia: http://members.lycos.co.uk/WoodyPlantEcology/docs/e-lalibela.rtf	Free
Congress abstract	Knowledge of woody plant resources and their utilization by the clergy and local communities in Ethiopian church and monastery yards, Desalegn Dessisa and P. Binggeli, the Eighth ISE International Congress, (2002), p52.	International Society of Ethnobiology, Athens, USA	International Society of Ethnobiology, Department of Anthropology, University of Georgia, Athens, GA 30602, USA http://www.cieer.org/pdf/program8.pdf	Free
Database*	Site accounts of church and monastery forests. P. Binggeli and Desalegn Dessisa, University of Wales Bangor (2003), 38pp.	University of Wales Bangor, UK	EWNHS PO Box 13303 Addis Ababa Ethiopia and UWB, U.K http://www.safs.bangor.ac.uk/ethiopia	Free
Manual*	Training materials, research objectives and questions with research protocol, Bianca Ambrose-Oji (2003), 100pp.	University of Wales Bangor, UK	Centre for Arid Zone Studies, University of Wales Bangor, UK	Free

Newsletter article	Trees, woodland and religious values in Kondaltiti (Gurage region), M. Painton, Newsletter of the EWNHS Jan.-March (2003), pp2-3.	EWNHS, Addis Ababa, Ethiopia	EWNHS PO Box 13303 Addis Ababa Ethiopia	Free
Newsletter article	Conservation of Ethiopian sacred groves. Binggeli, P., Desalegn Desissa, Healey, J., Painton, M., Smith, J. & Zewge Teklehaimanot, ETFRN Newsletter, No. 38, (2003) pp 37-38.	ETFRN, the Netherlands	http://www.etfrn.org/etfrn/newsletter/pdf/etfrnnews38.pdf	Free
Newsletter article	Ethiopian Church/Monastery forests, the theological basis for their preservation and threats identified today. Desalegn Dessisa, Zewge Teklehaimanot & Getachew Adane, Newsletter of the EWNHS July - Sept (2003), pp. 2-4.	EWNHS, Addis Ababa, Ethiopia	EWNHS PO Box 13303 Addis Ababa Ethiopia	Free
Journal paper	Biodiversity Conservation in Ancient Churches & Monastery Yards of Ethiopia, Desalegn Desissa, Getachew Adane, WALIA, Vol. 23, (2003), pp. 42-48.	EWNHS, Addis Ababa, Ethiopia	EWNHS PO Box 13303 Addis Ababa Ethiopia	Free to members
Database	Biodiversity status in seven focus church and monastery sites. Z. Teklehaimanot, J. Healey, J. Hall, B. Ambrose and Desalegn Desissa (2004).	University of Wales Bangor, UK	http://www.safs.bangor.ac.uk/ethiopia	Free
Database	Biodiversity status and conservation plans in five focus church and monastery sites. Z. Teklehaimanot, J. Healey, J. Hall, B. Ambrose and Desalegn Desissa (2004).	University of Wales Bangor, UK	http://www.safs.bangor.ac.uk/ethiopia	Free
Proceedings	Proceedings of the final workshop on biodiversity conservation in ancient church and monastery yards in Ethiopia, Z. Teklehaimanot, J. Healey, J. Hall, B. Ambrose and Desalegn Desissa (2004).	University of Wales Bangor, UK	http://www.safs.bangor.ac.uk/ethiopia	Free

Appendix IV: Darwin Contacts

Project Title	Biodiversity conservation in ancient church and monastery yards in Ethiopia
Ref. No.	162/10/031
UK Leader Details	
Name	Zewge Teklehaimanot
Role within Darwin Project	Principal Investigator
Address	University of Wales Bangor
Phone	
Fax	
Email	
Other UK Contact (if relevant)	
Name	John Healey
Role within Darwin Project	Co-principal Investigator
Address	University of Wales Bangor
Phone	
Fax	
Email	
Partner 1	
Name	Desalegn Desissa
Organisation	Ethiopian Wildlife and Natural History Society
Website address	
Role within Darwin Project	Research Project Officer
Address	Addis Ababa, Ethiopia, P. O. Box 13303
Fax	
Email	
Partner 2 (if relevant)	
Name	
Organisation	
Role within Darwin Project	
Address	
Fax	
Email	

Appendix V – Project Logical Framework

Project summary	*Measurable indicators*	*Means of verification*	*Important assumptions*
Goal *To assist countries rich in biodiversity but poor in resources with the conservation of biological diversity and the implementation of the Biodiversity Convention*	*Improved conservation of biodiversity and implementation of the Biodiversity Convention*	*National reporting to UN, independent assessment by international agencies, indicating achievement of targets in terms of species, habitats, training, public awareness etc.*	
Purpose *Sustainable development in Ethiopia promoted through participatory conservation of the biodiversity of the forests preserved on sacred lands, and their establishment as a resource of value to alleviate local poverty and for the nation as a whole*	*Maintenance of number of sacred sites retaining forest, maintenance of number of species present in sacred sites, increased rate of tree planting by community of native tree species from sacred sites, eventual reduction in local deficit of forest products*	*Annual reports of government. agencies, NGOs and church, potential for independent verification via remote sensing interpretation*	*Sacred-land forests do contain important populations of threatened Ethiopian species; local people are prepared to grow some of the species present and use them as a substitute for further depletion of threatened habitats*

Outputs *1. Key NGO/government institutions strengthened – 6 Ethiopian staff trained in each of:* *1.1 participatory species identification & assessment,* *1.2 participatory rural appraisal for biodiversity,* *1.3 ex-situ conservation,* *1.4 in-situ conservation;* *2. Management plans for habitats, species and sites;* *3. Field-guide on biodiversity identification/appraisal;* *4. Three peer-rev. papers;* *5. NGO-Gov-Church-community networks strengthened;* *6. Wider Ethiopian public informed via media;* *7. Ex-situ conservation centre established.*	*1. Enhanced capacity/ expertise of institutions/staff in each of these fields;* *2. Management plans of sufficient quality held and used by key institutions;* *3. Field-guides held and used by key institutions;* *4. Papers submitted for publication;* *5. Increased collaboration in on-going work & new projects;* *6. Enhanced public attitude to/knowledge of biodiversity conservation;* *7. Centre exists, is stocked & producing planting material;* *All by end of project, or earlier if stated in section 13*	*1., 5., 7. Institutional annual reports, independent reports for/of donor agencies;* *2. Copies of plans available from institutions on request;* *3. Copies of guides available from institutions on request;* *4. Copies of letters of receipt from editorial offices;* *6. A public attitude survey could be commissioned, otherwise increase in membership of EWNHS would be an indicator;* *7. Centre could be visited.*	*1. Trained staff remain working in the conservation sector, institutions retain sufficient staff and resources to remain effective,* *2. to implement management plans,* *3. to carry out further biodiversity identification/ appraisal;* *4. Papers published and influence key practitioners;* *5. Network members continue to collaborate successfully;* *6. Public have means to influence conservation outcomes;* *7. Centre operations become sustainable, community willing to purchase and plant the material it supplies.*

Activities *1. Planning workshop* *2. Selection of target sites* *3. Local consultation & rapid biodiversity assessment at each* *4. Workshop to select focus sites* *5. Participatory appraisals* *6. Biodiversity inventories* *7. Priority species identification and assessment of status* *8. Wide-participation workshops to develop conservation plans* *9. In-situ conservation work* *10. Ex-situ conservation in newly established centre* *11. Reintroductions of species to selected sites and provision of planting material to local people* *12. Dissemination of outcomes to local people and wider public*	*Budget expenditure according to plan*	*Production of:* *1. Workshop report* *2. List of 40+ sites* *3. Report (data on each site)* *4. Workshop report containing list of 6 + sites* *5. Analysed appraisals* *6. scientifically analysed inventories for each site* *7. scientific report on status of each priority species (20+) in full technical report* *8. Workshop report and full conservation management plan* *9. Job sheets detailing work* *10. + 11. Centre physically exists, job sheets, EWNHS & IBCR annual reports (with financial accounts)* *12. Newsletters, press cuttings, video/audio tapes*	*1., 4., 8. Key individuals/ stakeholders attend, recom-mendations written-up into plans and implemented* *2. Local co-operation* *3., 6. Species identified correctly, threatened species present* *5. Appraisals sufficiently informative* *7. Status assessment accurate* *9., 11. Adequate stakeholder participation, experience assessed & incorporated into plans* *10. Institutional support for centre maintained* *12. Local people respond, media publish/broadcast project news*