

Conservation of Ethiopia's Church Forests

The ecology of Ethiopia is vastly understudied and also degrading rapidly due to human activities. Much of the natural landscape has been cleared for agriculture, with one notable exception: the sacred landscapes surrounding churches. These church forests comprise local as well as global “hotspots” as critical conservation areas for a large portion of Ethiopia’s remaining biodiversity. Vegetation surveys of church forests indicate that church forests house a large proportion of the endangered plant species of Ethiopia. Church forests provide important ecosystem services to local people, including fresh water, pollinators, honey, shade, and spiritual value. In January 2009, we forged a partnership with the Christian Orthodox clergy to conserve their church forests.

We propose two goals: 1. to survey the biodiversity of insects in Ethiopian church forests, creating relatively inexpensive, replicable protocols that can be utilized by local children; and 2. to fund simple perimeter delineation (aka, fences) thus preventing further shrinkage of church forests from human activities. Further, we will place special focus on assessing the ecosystem services that insects contribute to these remaining fragments of tropical forest ecosystems, creating a strong case for local conservation initiatives. Throughout our field work, we plan to engage local Sunday school children as future stewards of these church forests, utilizing the church infrastructure to educate and inspire local stakeholders about their local biodiversity. Results of the ecological surveys will be published in appropriate international journals, but a conservation plan utilizing the church (especially Sunday school children) as a focal group will also be disseminated, reflecting a culturally-sensitive solution.



Fig.1 Debresena church forest- South Gondar, Ethiopia (Picture from Google earth)

METHODOLOGY

We have selected three paired sites (6 forests; Table 1) for this preliminary biodiversity survey. Site selection was based on three main criteria:

- a. Inclusion of the range of important elevations of Ethiopian church forests, spanning 1800 m to 3200 m.
- b. Paired comparison of small (<5 ha) versus large (>5 ha) church forests. We are aware that increasing human pressures will likely decrease the size (not increase) of church forests, but we hope to quantify the relationship between relative arthropod diversity and abundance and size of church forests.
- c. Church forests with an active Sunday school program and also with an adjacent elementary school.

This will give possible comparisons at three spatial scales: within/between transects at each site, between different sized-church forests, and among elevations.

Table 1. Church forests selected for the survey

Pair	Name of site	Forest Size	Altitude	Location	Remark
1	Ascha	1.6	3111	N11° 43' & E38° 28'	Higher altitude
	Deder	14.4	3100	N11° 32' & E38° 14'	
2	Hiruy	4	2611	N11° 51' & E38° 03'	Medium
	Debresena	11.5	2690	N11° 51' & E37° 59'	Altitude
3	Emashenkor	3.4	2006	N11° 42' & E37° 37'	Lower
	Zhara	8	1950	N11° 48' & E37° 34'	Altitude

The methodology for sampling insects attempts to create a protocol that can be adapted to other developing countries where such surveys may provide important information about the ecology of insects and their conservation:

3. EXPECTED OUTCOMES

The overall outcome of the project is to quantify insect diversity and abundance within the plant community in Ethiopian Church forests, and to assess the ecosystem services that provide basic information for conservation of these forests (e.g. pollination, herbivory, production of honey). Specific outcomes include:

- a. quantify relative distribution and abundance of insects in Ethiopian church forests
- b. describe the effect of elevation and size of forests in the relative distribution and abundance of insects in Ethiopian church forests
- c. assess positive and negative insect-plant interactions, especially those providing ecosystem services
- d. recommend practical conservation measures for church forests in Ethiopia, including engaging local children in Sunday Schools and elementary schools to learn to identify and understand the role of insects in Ethiopian ecology
- e. communicate findings to the church administrators, local stakeholders, and conservation authorities
- f. published results to include: a methodology for relatively inexpensive but accurate comparisons of the tropic structure of insect biodiversity in habitats of developing countries, hopefully published by Yale University Press as a manual; an ecological paper describing the abundance and diversity of arthropods in Ethiopian church forests to submit to *Biotropica*; a conservation paper for *Conservation Biology* outlining the potential for Sunday schools and/or elementary schools to engage in stewardship of their biodiversity, especially challenging in a culture where the outright ethic of scientific conservation is not established; and a church forest biodiversity publication circulated in an African journal.