# Sacred natural sites provide ecological libraries for landscape restoration and institutional models for biodiversity conservation

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## Introduction

In spite of expanding formal protected areas and numerous global agreements to reduce the impacts of human activities on the environment, clearing of the world's natural forests and the resultant loss of biodiversity and ecosystem services continues at an alarming pace (Watson et al., 2014). The causes of deforestation are diverse and complex, including economic and institutional factors, compounded by climate change. The Strategic Plan for Biodiversity agreed upon at the 10th Conference of the Parties to the Convention on Biological Diversity emphasized the need for investment in institutions for the protection and management of biodiversity and ecosystems (CBD, 2010), with Rio+20 discussions noting *"these institutions must be able to cope with changes in ecosystems, steer away from abrupt change in ecosystem function, and provide a buffer from the most detrimental consequences of unavoidable changes"* (Díaz et al., 2012).

But creating institutions for conservation and biodiversity management can be both difficult and costly (McCarthy, 2012). Conservation can be especially challenging in vast human-modified landscapes such as farmland and pasture which comprise much of the 84.6% of the Earth's land area which remains outside formal protected areas (UNEP-WCMC, 2014). One alternative to building new institutions from scratch is supporting and learning from conservation institutions that exist. Sacred natural sites – such as the thousands of Ethiopian Orthodox church forests scattered across Ethiopia's Northern Highlands (Figure 1) – represent ecologically and institutionally diverse libraries of biodiversity, whose full ecological and institutional values have only begun to be appreciated.

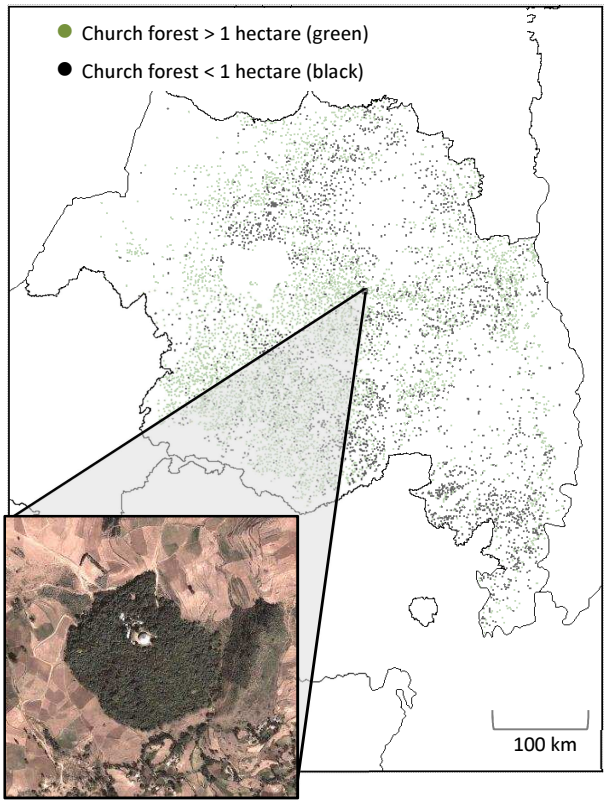


**Figure 1. Church forests in Amhara Region, Ethiopia.** There are over 8,000 church forests in the Amhara Regional State of Northern Ethiopia. Church forests can be found at virtually every latitude, longitude and elevation, and in every agroecology in the region.

## Ecological values of sacred spaces

Forest patches conserved around places of worship are found worldwide (Bhagwat and Rutte, 2006). In Tanzania there are over 600 sacred groves, in Ghana

over 2,000 sacred forests, in India over 100,000; and in Japan Shinto and Buddhist shrine forests cover over 110,000 hectares (Verschuuren, 2010). In addition to providing cultural values, these geographically dispersed sacred natural sites serve as key refugia for plant and animal species (Mgumia and Oba, 2003), as well as increasing water filtration, reducing soil erosion, and providing an array of other ecosystem services (Bodin et al., 2006).

In Ethiopia there are more than 35,000 Orthodox church communities (Wassie et al., 2009), with new high-resolution satellite imagery revealing more than 8,000 church forests ranging from <1 hectare to over 100 hectares distributed across the Amhara Region (Figure 1). Though the ecology of this diverse set of sacred natural sites has only begun to be studied, surveys of a small sample of 28 church forests revealed a stunning 168 woody species - including 160 indigenous to Ethiopia (Wassie et al., 2010). Ongoing research also provides evidence that church forests harbor vast insect biodiversity (Ermilov et al., 2012), provide pollination and hydrological services for nearby farmland (Lowman, 2011), and serve as seed banks for native plants that have otherwise vanished from the region (Aerts et al., 2006).

***Table 1. Threats to sacred natural sites in Ethiopia and implications for biodiversity conservation***

| Threats to sacred natural sites | Description and implications for biodiversity conservation |
|---|---|
| *Economic* drivers of forest degradation | Ancient church forests face threats from livestock grazing, but also from communities converting biodiverse forest patches to more economically rewarding *Eucalyptus* plantations. |
| *Environmental* drivers of forest degradation | Low species population densities and low natural regeneration, combined with climate change and associated threshold effects, threaten the long-term viability of indigenous groves. |
| *Cultural/social* shifts and changing demographics challenging forest "sacredness" | Institutions that have protected forests for centuries may be changing, shifting community norms away from conservation. Some church communities now prioritize economic rewards from planting exotic tree crops over traditional values from indigenous trees. |

*Source:* Author compilation

But in spite of their ecological and spiritual benefits, due to a combination of economic, environmental, and cultural factors the integrity of church forests – like many other sacred natural sites – has continued to decline (Table 1). Church forests are decreasing in both size and density, with visible losses in biodiversity due to livestock grazing, fuelwood harvesting and other pressures (Wassie et al., 2010). Grazing in particular causes irreversible damage through consumption and trampling of seedlings, soil compaction and erosion (Wassie et al., 2009). Moreover, as small forest fragments are degraded, biodiversity suffers even further from physical edge effects such as light intensity, wind and temperature variability, and reduced soil moisture and humidity (Aerts et al., 2006) – feedback loops that will likely become even more severe with climate change (Cardelús et al., 2013). Finally, with rising populations and rising incomes some communities have actively cleared forest to construct church buildings or expand burial sites – traditional practices that now exceed forests' regenerative capacity. Shifts in economic incentives and cultural norms have led other communities to plant cash crop trees such as *Eucalyptus spp.* in church forests rather than the traditional nurturing of indigenous seedlings, leaving forests even more impoverished in terms of floristic diversity (Bongers et al., 2006).

The dwindling biodiversity of sacred natural sites has begun to attract international attention (Verschuuren et al., 2010), and some ecologists now advocate prioritization of sacred natural sites for preservation (Shen et al., 2012). The IUCN has published a guide for protected area managers on the subject of sacred natural sites (Wild et al., 2008). And in Ethiopia some conservation institutions are directly funding stone wall construction around church forests to protect ecologically valuable sites (TREE, 2014).

**Institutional values of sacred natural sites**

Remaining largely unappreciated, however, is the vast potential to learn from the *institutional diversity* of sacred natural sites (Ostrom, 2009). From an institutional perspective the diverse and dispersed sacred sites across the globe, conserved by local communities for a host of spiritual and social values, represent the oldest protected areas management systems in human history (Verschuuren, 2010). Thus in

addition to their immediate ecological conservation value, sacred sites such as Ethiopian church forests are also examples of powerful social institutions that have ensured the provision of cultural and ecological ecosystem services for generations. The enduring strengths and recent transformations of these institutions can thus offer invaluable lessons for conservation policy.

In Ethiopia, the Ethiopian Orthodox Tewahido Church is one of the oldest Christian churches in Africa and has a long history of protecting and preserving indigenous forest as sanctuaries for prayer and burial grounds for church followers. In a general sense the forests surrounding churches are seen as sacred, with the trees symbolic of angels guarding the church (Wassie et al., 2010). However at the community-level each church operates largely autonomously, with each having developed its own contextually-defined approach to forest management. In some cases church forest governance has involved the construction of walls clearly demarcating forest boundaries (TREE, 2014). In other areas the church pays guards to patrol forests to detect and punish trespassers (with punishments varying across churches – from public apologies before the community to arrest by police for more serious infractions). In still other communities some extractive uses of church forests are permitted – such as harvesting wild fruits, honey, or fuelwood from dead church forest trees. At times even harvesting live trees is allowed – typically for church building construction or repair, or (even more rarely) for sale of indigenous timber to neighboring churches (Bongers et al., 2006).

From a strict conservation perspective many such extractive forest uses cannot be sustained. But from an institutional perspective the diverse uses of church forests, often strictly conservationist but sometimes more utilitarian, is a key part of how indigenous trees have been conserved in Ethiopian Orthodox church forests while natural forest has all but disappeared elsewhere. In other words, the thousands of church forests across the Northern Highlands can be understood not only as precious islands of biodiversity and culture in need of preservation, but also as invaluable experiments in "what works" for protected areas management in Ethiopia across a variety of social, economic and environmental contexts.

**Issues for further consideration**

Sacred forests represent a unique stroke of good fortune for the conservation community, but without support for continued management of indigenous biodiversity this luck may not hold. Curbing the global biodiversity crisis will require learning from any and all successful conservation institutions, including traditional and religious institutions (Carrière et al., 2013). Sacred sites in the midst of human-dominated agroecosystems in low-income countries can have a particularly profound impact on conservation outcomes, as much of the remaining land in biodiversity-rich areas is used by rural farmers and pastoralists.

The full potential benefits from the ecological and institutional diversity of sacred natural sites can only be realized through:

- Enhancing efforts to catalogue and monitor sacred natural sites to ensure biodiversity and institutional knowledge are not lost;
- Studying the institutional structures of sacred forest systems, learning from past forest conservation successes and identifying how ancient institutions adapt (or fail to adapt) to modern challenges and changing incentives;
- Promoting ongoing stewardship through active consideration of sacred natural sites in national and international policies, including exploring options for payments for ecosystem services (PES) to church communities.

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