Conservation from the Grave: Human Burials to Fund the Conservation of Threatened Species

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Abstract
Most conservation scientists and practitioners are unaware that their corpses can transform into protected areas after death. The practice is called a conservation burial, where burial fees fund the acquisition, protection, restoration, and management of new land to benefit human and environmental well-being. If conservation burials became commonplace, then the revenue generated could exceed the amount of money required to fund the conservation of every threatened species on the planet. The additional human-health benefits of increased urban greenspace could also be substantial. As Halloween, “the day of the dead,” approaches, we urge governments, NGOs, and the public to contemplate how death can support future life on earth through conservation burials.

Biodiversity Benefits
Consider the possible revenue generated by conservation burials. The average U.S. funeral costs $7,180 (NFDA General Price List Survey 2015). Considering 2.7 million Americans die each year (Xu et al. 2016), potential funeral revenue is roughly $19 billion/year. This is far more than the estimated $3.4-$4.8 billion/year required to protect and manage the habitat of every IUCN threatened species in the world (McCarthy et al. 2012). While a large portion of funeral costs are for ceremonial expenses unrelated to the acquisition and maintenance of the grave site (NFDA General Price List Survey 2015), natural burials eliminate body preservation and use cheaper materials (Harker 2012; Kelly 2012). Conservation burials divert this saved money toward habitat protection and restoration. The average U.S. casket and embalming costs $2,395 and $695, respectively (NFDA General Price List Survey 2015). Therefore, if all Americans who embalmed their remains (45%; NFDA Cremation and Burial Report 2015) purchased a conservation burial instead, U.S.
burials could produce $3.8 billion in conservation revenue. While not every threatened species can benefit directly from conservation burials, the hypothetical revenue demonstrates substantial potential for increased biodiversity.

Given the majority of the world’s population lives in cities, and that people often need to visit burial sites, it is important to consider the biodiversity gains if conservation burials only fund the protection and restoration of habitat in urban areas. In this case, the biodiversity benefits would still be significant. Humans commonly live in biodiversity hotspots (Cincotta et al. 2000), containing many threatened species (Schwartz et al. 2002) whose persistence can only be achieved through successful management (Hahs et al. 2009; Aronson et al. 2017). In both the United States and Australia, cities contain disproportionately more threatened species than nonurban areas (Schwartz et al. 2002; Ives et al. 2016). Regardless as to whether rare species are threatened by or attracted to urban conditions, systematic spatial planning of urban greenspace can protect these species, which risk extinction otherwise (Bekessy et al. 2012). Conservation burials provide a mechanism to fund such necessary planning. For example, if everyone living in Manhattan, New York, received conservation burials when deceased, then within three generations, 2% of the island would become new urban nature reserves (see supporting information).

Traditional cemeteries can also provide cities with habitat for native wildlife (Barrett & Barrett 2001; Kowarik et al. 2016; Attila Molnár et al. 2017; De Lacy & Shackleton 2017). Therefore, one must consider the benefit of conservation burials optimized to meet societal and conservation objectives, against this baseline, rather than against the elimination of cemeteries altogether. That said, grave sites focused on conservation will likely provide additional biodiversity benefits. For example, Muslim cemeteries in Albania, which use conservation-friendly burial practices, are correlated with higher native orchid biodiversity compared to the average Albanian cemetery (Molnár et al. 2017).

**Human Health Benefits**

After the death of a loved one, especially if unexpected, the risk of developing nearly all mental illnesses increases for the deceased’s survivors (Keyes et al. 2014). Human exposure to greenspace improves physical, social, and mental well-being (Shanahan et al. 2015, 2016). Therefore, using burials to restore and conserve natural habitat in urban areas is not only an opportunity to increase biodiversity but also to improve the well-being of grieving individuals and the public. GIS coordinates and small, unobtrusive stones mark the grave sites in protected areas so individuals can visit the deceased while experiencing the benefits of connecting with nature.

Conservation burials do not preclude the donation of one’s body to medical research and education. In fact, such a donation, followed by a conservation burial, could act synergistically to improve the health and well-being of the living by targeting mental and physical health simultaneously through increased medical research and greenspace.

**The state of conservation burial**

Conservation burials have officially existed since 1998, with sites in the United States (Harker 2012), Canada, and the United Kingdom (Wienrich & Speyer 2003) funding diverse habitats from meadows to forests. While regulations governing burial practice are spatially heterogeneous, in most western countries there are no laws significantly obstructing the use of burials to fund conservation. For example, in the United States and Australia, burial regulations are easy to follow for deceased individuals that did not die from infectious diseases. Merely having the burial overseen by a licensed funeral director generally suffices to guarantee the burial’s legality. In the United Kingdom, even this is not required.

While official conservation burial grounds mostly exist within the western world, elements of conservation burial are both geographically and culturally commonplace. Cemeteries engaging in sustainable practices are widespread across every continent (Kelly 2012). Many indigenous cultures have unofficially practiced aspects of conservation burial for centuries. Even newer religions, such as Islam and Judaism, either discourage or prohibit unnatural burial practices (Clements et al. 2003), resulting in cemeteries with high levels of biodiversity (Kowarik et al. 2016; De Lacy & Shackleton 2017; Molnár et al. 2017). Therefore, adoption of conservation burials may be culturally viable despite diverse values.

While precedence for conservation burial exists, after-death rituals are deeply personal, involving sacred traditions (Clements et al. 2003) that must be considered when contemplating the expansion of conservation burials. While some religious practices align well with conservation principles, others can clash with environmental protection. Therefore, any conservation burial message must be carefully crafted so that it does not disrespect people from diverse backgrounds. But the connection of human burial to religion is also an opportunity, as the spiritual significance of sacred sites can enhance the net value of conservation areas (Higgins-Zogib et al. 2010; Jackson & Ormsby 2017).
Conservation from the grave—a way forward

While conservation burials currently exist and policies in several localities may not be a hindrance, options need to be considered to increase adoption and capitalize on wide-scale benefits. First, we must inform people of the option and its societal value. Channels to inform the public mostly exist. Policies that dictate licensed funeral directors to oversee burial practices provide a path for guaranteed information delivery on conservation options. Furthermore, many people take out funeral insurance, paving the way for companies to offer cover for environmentally ethical funeral packages. Governments can also encourage conservation burials through rebate schemes on funeral insurance premiums and by mandating funeral agencies provide information on conservation burials. Governments could also create national registries of individuals who request their bodies be donated to conservation.

Perhaps the greatest challenge facing widespread conservation burial adoption is convincing individuals to divert money saved from cheaper practices, such as cremation or natural burials, specifically toward conservation. We suggest that NGOs engage with cemeteries to use the principles of conservation marketing (Wright et al. 2015), capitalizing on the desire for individuals to want the best for their deceased loved ones. Such practices can take advantage of personal motivations to connect with the most awe-inspiring, unique, and critically endangered sites. This could incentivize the diversion of money for elaborate caskets and grave markings toward conservation. An example of personalization exists in Honey Creek Woodlands, part of a heritage area in Georgia, United States, which allows people to select burial sites among ecosystem types, to best match the desires of the deceased and their families (Harker 2012).

As Halloween, “the day of the dead,” approaches, we urge governments, NGOs, and the public to contemplate and celebrate how death can and should support future life on earth. If conservation burials became as commonplace as similar types of after-death charity, such as organ donation, then the biodiversity benefits would be enormous.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher’s web site:

If everyone who died in Manhattan received a conservation burial, assuming plot sizes equal to that of traditional graves, 1.84 m², and the 2010 NYC mortality rate and the Manhattan population size of 1.65 million, then 0.034% of Manhattan’s land per year would go toward greenspace. This is computed as follows. In 2010, there were 52,000 deaths in NYC (http://www.nyc.gov/html/records/pdf/govpub/6551as_2010_final_population&_mortality.pdf). The population size of NYC is 8.5 million and Manhattan is 1.65 million. This implies approximately 10,094 deaths per year in Manhattan. Manhattan is 59.1 km², implying 170.8 deaths per km², which yields the conversion rate of .0003416 proportion of land per year to nature reserves, assuming 2 m² graves.

This is likely an underestimate as conservation burials tend to use larger plot sizes than conventional burials.

References

Aronson, M.F., Lepczyk, C.A., Evans, K.L., et al. (2017). Biodiversity in the city: key challenges for urban green space management. Front. Ecol. Environ., 15, 189-196.

Attila Molnár, V., Lőki, V., Mátc, A., et al. (2017). The occurrence of Spiraea crenata and other rare steppe plants in Pannonian graveyards. Biologia (Bratisl), 72, 500-509.

Barrett, G.W. & Barrett, T.L. (2001). Cemeteries as repositories of natural and cultural diversity cemeteries as repositories of natural and cultural diversity. Conserv. Biol., 15, 1820-1824.

Bekessy, S.A., White, M., Gordon, A., Moilanen, A., Mcgarthy, M.A. & Wintle, B.A. (2012). Transparent planning for biodiversity and development in the urban fringe. Landsc. Urban Plan., 108, 140-149.

Cincotta, R.P., Wisnewski, J. & Engelman, R. (2000). Human population in the biodiversity hotspots. Nature, 404, 990-992.

Clements, P.T., Vigil, G.J., Manno, M.S., et al. (2003). Cultural perspectives of death, grief, and bereavement. J. Psychosoc. Nurs. Ment. Health Serv., 41, 18-26.

De Lacy, P. & Shackleton, C.M. (2017). Woody plant species richness, composition and structure in urban sacred sites, Grahamstown, South Africa. Urban Ecosyst., 20, 1169-1179.

Hahs, A.K., McDonnell, M.J., McCarthy, M.A., et al. (2009). A global synthesis of plant extinction rates in urban areas. Ecol. Lett., 12, 1165-1173.

Harker, A. (2012). Landscapes of the dead: an argument for conservation burial. Berkeley Plan. J., 25, 150-159.

Higgins-Zogib, L., Dudley, N., Mallarach, J.M. & Mansourian, S. (2010). Beyond belief: linking faiths and protected areas to support biodiversity conservation. Page 273 in S. Stolton, N. Dudley, editors. Arguments for protected areas multiple benefits for conservation use. Earthscan, London.

Ives, C.D., Lentini, P.E., Thrrellall, C.G., et al. (2016). Cities are hotspots for threatened species. Glob. Ecol. Biogeogr., 25, 117-126.
Jackson, W. & Ormsby, A. (2017). Urban sacred natural sites – a call for research. Urban Ecosyst., 20, 675-681.
Kelly, S. (2012). Dead bodies that matter: toward a new ecology of human death in American culture. J. Am. Cult., 35, 37-51.
Keyes, K.M., Pratt, C., Galea, S., McLaughlin, K.A., Koenen, K.C. & Shear, M.K. (2014). The burden of loss: unexpected death of a loved one and psychiatric disorders across the life course in a national study. Am. J. Psychiat., 171, 864-71.
Kowarik, I., Buchholz, S., von der Lippe, M. & Seitz, B. (2016). Biodiversity functions of urban cemeteries: evidence from one of the largest Jewish cemeteries in Europe. Urban For. Urban Green., 19, 68-78.
Krupar, S.R. (2017). Green death: sustainability and the administration of the dead. Cult. Geogr., 1-18. http://journals.sagepub.com/doi/10.1177/147447401732977
McCarthy, D.P., Donald, P.F., Scharlemann, J.P.W., et al. (2012). Financial costs of meeting global biodiversity conservation targets: current spending and unmet needs. Science, 338, 946-949.
Molnár, A.V., Takács, A., Mizsei, E., et al. (2017). Religious differences affect orchid diversity of Albanian graveyards. Pak. J. Bot, 49, 289-303.
NFDA Cremation and Burial Report [WWW Document]. (2015). http://www.nfda.org/news/statistics. Accessed on 29 August 2017.
NFDA General Price List Survey [WWW Document]. (2015). http://www.nfda.org/news/statistics. Accessed on 29 August 2017.
Schwartz, M.W., Jurjavic, N.L. & O’Brien, J.M. (2002). Conservation’s disenfranchised urban poor. Bioscience, 52, 601-606.
Shanahan, D.F., Fuller, R.A., Bush, R., Lin, B.B. & Gaston, K.J. (2015). The health benefits of urban nature: how much do we need? Bioscience, 65, 476-485.
Shanahan, D.F., Bush, R., Gaston, K.J., et al. (2016). Health benefits from nature experiences depend on dose. Sci. Rep., 6, 28551.
Wienrich, S. & Speyer, J. (2003). The natural death handbook. Rider, London.
Wright, A.J., Veríssimo, D., Pilfold, K., et al. (2015). Competitive outreach in the 21st century: why we need conservation marketing. Ocean Coast. Manag., 115, 41-48.
Xu, J.Q., Murphy, S.L., Kochanek, K.D. & Arias, E. (2016). Mortality in the United States, 2015. Data Brief, No 267. National Center for Health Statistics. Hyattsville, MD.