Conservation Biology

Diversity

Leveraging natural capital to solve the shared education and conservation crisis

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Introduction

Education and conservation have a shared crisis: neither fully serves diverse populations. Where poverty, race, and ethnicity covary, those left behind educationally are disproportionately from underrepresented groups. Global achievement gaps associated with socioeconomic and minority status have existed for decades (Morgan et al. 2016). These populations are also underrepresented in conservation professions; thus, conservation decisions often reflect the views of elites (Foster et al. 2014). Conservation and education have shared problems, and we argue they have shared solutions.

Natural capital (NC) represents an underused resource for raising school performance and engaging broader constituencies in conservation. In conservation settings, NC is the natural resources that provide ecosystem services such as flood control (Costanza et al. 1997). We suggest NC, from microbes on students' skin to school gardens, is a useful concept applicable to improving academic achievement. Leveraging NC includes planting trees outside classroom windows and near schools to boost academic achievement (Hodson & Sander 2017) and employing nature-based instruction to improve science education and foster conservation-minded citizens (Stern et al. 2013). Others highlight how nature-based instruction builds general science literacy (Wals et al. 2014) and interest in conservation (Ehrlich & Pringle 2008). We build on this work by framing NC as an asset that can be used to address resource deficiencies in K-12 education, highlighting mutually reinforcing benefits of NC for education and conservation, and offering suggestions for leveraging NC to benefit education and conservation.

Capital Deficit in Education

Multiple types of capital—financial, human (e.g., knowledge and character), and social (e.g., cooperation)—are used to create human capital among children (Parcel & Dufur 2001). Philanthropic programs providing financial and manufactured (e.g., facilities) capital to schools have successes but few lasting effects because they are unsustainable capital investments (Reckhow 2015). Investing in human capital, such as training teachers, is more sustainable (Akiba & Guodong 2014) but takes time, sometimes generations. Further, teachers in some regions are fleeing the profession, citing low pay, low morale, and shrinking benefits, and teacher shortages are most acute in underserved areas (Akiba & Guodong 2014). Social capital is an important part of any solution, yet educational investments meant to address social inequity are typically supported by external funding, rendering them unsustainable.

Although these types of capital investments are essential, they inadequately address educational inequalities. Programs that invest financial, human, and social capital have insufficient collective impact on educational achievement disparities. We suggest NC is an ignored form of capital available to all schools irrespective of socioeconomic status.

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Natural Capital as a Potential Solution

Natural capital can be used to benefit students. Nature-based curricula increases test scores, decreases discipline problems, and increases enthusiasm for learning and higher cognitive functioning (SEER 2000). Although low-income students may enter school lagging developmentally and under stress, children who spend time in nature may have longer attention spans, enhanced cognitive and social development, and lower stress levels (Chawla 2015). All children benefit from nature-based instruction, and in some cases especially underserved students (SEER 2000). Further, benefits of NC for underserved students dovetail with the goals of other capital investments (e.g., Head Start), suggesting mutual gains are possible.

Perhaps the most promising aspect of NC is it can literally be grown, unlike funds. Accessing NC can be as easy as going outdoors. In urban centers, students may have less access to the obvious forms of NC such as trees or tigers, but even in these cases NC is everywhere among the myriad of small species. We do not minimize the inequalities associated with access to nature among those underserved by schools, and we wholly support efforts to mitigate them. But we suggest that even the poorest schools can leverage NC with little additional capital investment. Microbes are more easily grown than gardens and may broaden students' perceptions of the living world, likely a key step in ensuring continued support for conservation (Dunn et al. 2006). Although accessing this form of NC may sound expensive in terms of financial capital (e.g., microscopes) and human capital (e.g., teachers with specialized training), resources are available through citizen science for teachers to explore microbial life.

Unlike other forms of capital, NC may be unrelated or negatively related to affluence. Most schools with more financial resources have better teachers, materials, and buildings. With NC this pattern may differ. In the United States, urban schools have the highest percentage of students qualifying for free or reduced-cost lunch (70%), but 26% of the poorest school districts are in rural areas (NCES 2013). For high-poverty schools in urban areas, NC is available through, for example, urban gardening programs, which boost academic achievement (Blair 2009). Further, some poor rural schools may have more NC than affluent urban schools, and worldwide the highest levels of biodiversity are in the poorest regions (e.g., East Africa). We cannot explain the geography of NC available to schools globally, but we suggest it needs to be understood.

Why the Conservation Community Should Care

Although we likely do not need to persuade conservation professionals that NC is valuable for education, we contend our proposal highlights the most important action the conservation community can take to save biodiversity. Slowing biodiversity loss depends largely on a conservation-minded citizenry. However, current outreach efforts fail to reach the majority of adults, and in general the conservation community is not diverse (Foster et al. 2014). Because most countries have compulsory education, leveraging NC in schools is an equitable and far-reaching method that holds enormous potential for building diverse and worldwide support for conservation. Further, education receives a higher policy and investment priority than conservation globally. The $585 billion education spending in the United States alone (OECD 2013) is nearly 8 times more than the $76 billion advocated for global biodiversity conservation (McCarthy et al. 2012). Coupling education and conservation efforts may create benefits for the conservation community that are unachievable otherwise.

Nature-based instruction can encourage proenvironmental attitudes and behaviors among diverse populations of children. Environmental education curricula (e.g., Project WILD) promote environmental knowledge, problem-solving skills, and proenvironmental attitudes and behaviors (Stevenson et al. 2013). These benefits may be realized most among groups traditionally underrepresented in conservation (Larson et al. 2011; Stevenson et al. 2013). Further, nature-based experiences may shape lasting personal identities centering around conservation and environmental engagement (Chawla 2015).

Investing in NC-based solutions to inequalities in education and conservation may also offer an alternative pathway to influencing conservation policy. Many conservation challenges are mired in identity politics that drive adult perceptions of conservation issues (Kahan et al. 2011). Children, however, seem more able to parse scientific information from its political context (Stevenson et al. 2014*b*), and some research suggests the benefits of NC-based interventions, such as elevated environmental attitudes and behaviors, may trickle up to adults if interventions actively involve parents, focus on local environmental issues, and include hands-on and action-oriented activities (Duvall & Zint 2007).

A Path Forward

Leveraging NC in schools may be one of the most important steps toward ensuring future, and even current, generations are equipped and motivated to turn the tide of anthropogenically induced biodiversity loss. Capitalizing on this potential requires promoting teacher awareness of ubiquitous sources of NC and developing ways to use NC in classrooms. Teachers need help integrating NC into curricula aligned with teaching standards. Even if conservation scientists do not identify as educators, they can be aware of and promote high-quality NC-based materials in schools. Teachers face additional barriers to adopting NC-based curricula including insufficient time and funding and misgivings about competence to teach science (Stevenson et al. 2014*a*), and conservation scientists can help by seeking opportunities to share content knowledge with teachers.

Experimental evaluation of nature-based instruction may help alleviate some barriers to NC-based curricula by demonstrating its efficacy in improving student achievement as measured by testing standards. The quantitative and experimental penchant among conservation scientists (Fazey et al. 2005) makes them natural partners with environmental—education–evaluation scholars hoping to develop defensible causal models for how NC-based interventions affect student outcomes. These partnerships would facilitate investigations of outcomes for education (e.g., science literacy) and conservation (e.g., lifelong conservation patterns), especially among underrepresented stakeholders. Similarly, conservation scientists may be able to experimentally test links between NC investments in schools and impacts on biodiversity.

As citizens, conservationists can contribute by supporting educational policies and programs that allow children to access the NC surrounding their schools. Conservation professionals, can engage with local K-12 communities by supporting professional development for teachers and programing for students. Although working with schools may be outside the normal realm of conservation scientists, it may be the single most meaningful thing we can do to ensure both equitable education and conservation.

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Supporting Information

References to links between specific NC-based interventions and outcomes, NC-focused education groups, and vetted examples of NC-based curricula including those entailing citizen science are available online (Appendix S1). The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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