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BOOK REVIEW: Halma, R. & Oplinger, C. S. (2001). *The Lehigh Valley: A Natural and Environmental History*. University Park, PA: The Pennsylvania State University Press. 361 pages. ISBN: 0271020946.

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Abstract

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Keywords

Environmental education, educational testing, professional development, curriculum, instruction

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The Lehigh Valley: A Natural and Environmental History by Robert Halma, Professor Emeritus of Biology at Cedar Crest College, and Carl S. Oplinger, Professor of Biology at Muhlenberg College, came to life as the first natural history guide for the Lehigh Valley. This book not only provides a detailed account of the natural history of the Lehigh Valley but also serves as a guide to inform readers about the environmental features of the Lehigh Valley, such as species, geologic formations, and attractions in the area.

As the name of the book indicates, the purpose of the authors is to present an overview of the natural history of the Lehigh Valley and how the environmental features of the Lehigh Valley have changed over time. The book can serve as a model reference for scholars from the natural and social sciences who may be writing a comprehensive, natural and environmental history of a locale, region, or biome. As for environmental education, this book is a treasure trove of environmental historical details and findings for implementing strategies to conduct community-based investigations into the environmental features of the Lehigh Valley. Besides, this book is also of great value for any local or international educational stakeholders who seek for supporting argumentation as for why environmental education should be integrated into the school curriculum and why it holds promise to make education more meaningful for students and for pedagogical approaches to effectively teaching environmental education content and concepts.

This book has reached its goal of presenting an overview of the natural history of the Lehigh Valley area. However, it fails to provide an extensive and thorough discussion of the area and of some provided statements. For example, the authors do detail soil patterns in the area and how certain soil patterns have especially helped shape the industry, direction, and economy of the Valley. However, how these rich soils have contributed to the diversity of crops grown in the Valley and to the development of farming in the area is very sketchily touched on with little explanation. Students who are interested in investigating why certain typical soil patterns in the

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area like limestones and shale loams may be beneficial for the growing of crops like hay, field corn, wheat, soybeans, alfalfa, and potatoes fail to find satisfactory answers in the book. A more specific description of what soil types are typical of each township or region at the municipal level in the Valley area could better direct students who wish to investigate the soil patterns where they live.

Another example of the lack of comprehensive and profound explanation to certain ideas introduced in this book can be seen in Chapter 3: "Human History in the Lehigh Valley." Though this chapter is designed to trace the influence of the early inhabitants and settlers on the environment in the area, whether humans had any impacts on the melting glaciers or on the extinction of woolly mammoth and several other mammals in the area is vaguely delineated.

The book helps readers trace the human influence of Native Americans, early Moravians, German settlers, and modern-day residents on the environmental features of the Lehigh Valley. The Lehigh valley - part of Pennsylvania which used to be referred by many western Europeans of the late seventeenth and eighteenth centuries as 'a veritable paradise'- attracted early immigrants with its rich soils, moderate climate patterns, original deciduous forests, and abundant geological and biological resources. Over time, humans have reshaped the environment in the area. The Valley's early economic and industrial development and population growth took a heavy toll on soil patterns, climate patterns, vegetation patterns, and the quality and quantity of fauna and flora in the area. Thanks to great efforts to protect the environment, the Lehigh Valley area has "enjoyed a substantial improvement in its water and air quality" (p. 293). Though the population in the Lehigh Valley area enjoys "a relatively clean environment in a pleasant blend of city and country, manufacturing and farming, and traditional and modern architecture" (p. xvi), the area still has to deal with hard-to-solve questions regarding the environment. One of them is: "How will the preservation of land and natural areas balance out with the desire for economic and industrial development and recreation and population growth?"

The book reserves particular concern about water environments in the Lehigh Valley area. Chapter 10, "Watercourse and Wetland Communities," besides dealing with these special and protected areas like river edges, swamps, marshes, ponds, creeks, and others, also aims to help readers imagine the historical aspects of the Lehigh River watershed area in comparison with its current features today. In centuries past, the Lehigh River served as a spawning ground for desirable sea-run species like shad, trout, and alewives. However, the economic and industrial development in the area, especially the construction of water-based transportation routes along the Lehigh River was made at the expense of the natural habitat for a myriad of aquatic species in the Lehigh River watershed area, including that for those desirable sea-run species. For example, pollutants from mining operations built during the American Industrial Revolution, and, more recently, acid mine drainage resulted in low-pH waters in the upper reaches of the river, significantly contributing to, not only destroying spawning and nursery areas of those fish species, but also creating favorable living conditions for less desirable species.

In Chapter 10, the authors highlight not only industrial pollution but domestic pollution from population centers in the lower Lehigh River basin that contributed to degradation for migrant and resident desirable aquatic species. The book also reveals that, due to the degradation of the river water, desirable watery species "were depressed in terms of biomass, numbers of individuals, and numbers of species" (p. 241) and were under threat by less desirable ones. Fortunately, thanks to environmental preservation efforts like the "Pennsylvania Rivers Month" program, the conditions in the Lehigh River watershed now "are improving slightly" (p.241).

Additionally, the Lehigh River is also described as a historical site which is worth preservation: The Lehigh River "served several times as a conference site for governors, their agents, and Indian chiefs during the early days of Penn's colony" (p.240) and is an ideal place to

“glimpse past glories of the valley’s industry and commerce, including Bethlehem Steel buildings and furnaces and remnants of the Lehigh Canal” (p. 242). Besides historical value, the Lehigh River watershed area offers potential for residents and visitors to engage in recreation pursuits and in the study of river life as the river quality continues to improve.

The construction of the Lehigh Canal significantly supported the development of industry and commerce in their heyday. Today, the remnants of the glorious past are expected to boost the development of tourism and historical and environmental education in the area. The availability of other transportation routes such as railroads, streets, and roads has definitely promoted the economic and agricultural development in the area. However, this has “produced more fragmentation of the forest and created all sorts of edges and variously sized patches of forest” (p.166) and led to the declining quality of soil, land, water, and air.

Among the wide array of human impacts on the Lehigh Valley environment delineated in this book, human impacts on vegetation patterns and on the change of soil, land, water, and air quality stand out. Twentieth-century development pressures, in the form of housing development, industrial development, and the construction of canals, numerous railroads, and roads have considerably reduced areas of original deciduous forests, which consequently negatively impact the diversity and distribution of plants and animals in the area. Furthermore, the housing growth due to the population growth in the area also has led to the loss of farmland and open space, which inherently reduces the quality of the living environment. Human activities from farming, timbering, industry, and housing projects in the area also have led to severe soil erosion, produced more forest fragmentation, changed the watershed, and even caused wider temperature fluctuations. These human impacts have taken their toll not only on the environment but also on local residents’ quality of life. For example, the increased warming poses a great threat to the well-being of the native brook and brown trout, which are rare in the Valley’s waters. This, in return, negatively impacts not only the biodiversity but also the economic and educational development in the area. The book also points out the dilemma in balancing out the preservation of land and natural areas with the desire for development. For example, the construction of more streets and roads are “inevitable and necessary” (p. 293), but it leads to numerous unintended consequences on the environment such as the degradation of adjacent streams and forest fragmentation.

Thanks to the concerns about the quality of the environment, environmental laws and regulations at different levels ranging from local to international have been passed and directly and indirectly influenced environmental decisions in the Lehigh Valley area. These decisions have been made individually and collectively. For example, the “National Environmental Act” passed in 1990 has contributed to the integration of environmental education in the curriculum of the schools in the area and as a result, this has helped enhance environmental literacy among individuals. As for collective environmental decisions, at certain townships, for example, strong agricultural zoning has been established to protect farmland. As a result, significant amounts of farmland can be permanently preserved.

Throughout the book, the authors discuss the environmental history and issues of the Lehigh Valley which offer educators opportunities for teaching learners about investigating environmental issues, the role of science-technology-society, personal and civic responsibility, service learning, and community-based research and problem solving. The book inherently possesses great implications for environmental education. Some of these are discussed in the following sections.

Cost-benefit analysis strategy. Throughout the book, the authors point out how population growth, housing development, economic and industrial development, the advancement of technology, the construction of canals, railroads, and additional streets and roads

have taken their toll on the environment, as well the quality of life in the Lehigh Valley area. However, the authors simultaneously imply these patterns may have been inevitable and necessary. For example, the accommodation of population growth and economic development is unavoidable and necessary but leads to the loss of farmland and open space. Road construction and highway improvements have made great contributions to the area, especially in terms of economic and industrial development and efficient transportation; however, they have degraded adjacent watercourses, partly caused forest fragmentation, affected the habitat of plants and animals, and consequently led to “a noticeable reduction in biodiversity” (p.259).

The controversial environmental issues touched on in the book are not unique to the Lehigh Valley’s area but apply to any corner of the world. If one happens to perform an internet search of any aspect of human impacts on the environment either at the local, national, or global levels, there is a great possibility that the results of his or her findings have considerable amounts of overlap with the human impacts on the Lehigh Valley’s area delineated by Halma and Oplinger. What contributes to making the value of this book extend beyond the border of Lehigh Valley’s area and making it worth reading for any local or international educators and learners who are interested in environmental education is that this book offers systematic and well-written explanations of the causes of environmental issues and satisfactorily and persuasively rationalizes why it is hard to make decisions on solutions to environmental problems.

Engaging students in environmental education with controversial issues offers great opportunities for students to develop their cost-benefit analysis skills. This strategy helps students become aware that environmental issues are complex and that there is not one “right” answer or simple solution to any environmental issue. Trade-offs are inevitable in any decisions, especially environmental decisions. Therefore, before any decision is made, costs and benefits associated with that decision and its alternatives should be carefully weighed. As a result, this cost-benefit analysis strategy can help students to develop not only decision making skills but also critical thinking skills.

Teaching environmental issue strategy. This book is ideal for teachers to practice an issues-based approach, providing students the context to be involved in authentic environmental issues in their local community. Students feel more engaged in subjects if they are presented with a real-world controversial issue. For example, the environmental issues discussed in the book, such as abandoned mine drainage, the loss of farmland, wetlands depletion, forest fragmentation, species loss of flora and fauna and their habitat, etc. not only help students become aware of the environmental issues they encounter in their own communities but also provide them information to investigate and analyze the real-life environmental issues from their perspectives and then formulate and evaluate possible solutions to those issues.

Developing children’s affective attitude toward nature strategy. Affective attitudes toward nature are thought to be a strong predictor of pro-environmental behaviors (Kales, Schumacher, & Montana, 1999). Therefore, connection to nature can predict children’s interest in participating in nature-based activities and environmentally friendly practices in the future (Kales et al., 1999). Kales et al. (1999) also suggest that children’s connection to nature is composed of four major elements: enjoyment of nature, empathy for creatures, a sense of oneness, and a sense of responsibility. The way the authors describe the Lehigh Valley area as a delightful valley with a fascinating natural history makes it hard for any readers to resist love for and curiosity about exploring the nature and environment of this area. The stories about the fate of the forests and the loss of habitats for plants and animals in the book can have the potential to trigger readers’ empathy for living and non-living creatures in the area in particular and in nature in general. The familiarity of those creatures in the local context helps create the sense of oneness for readers who live in the Lehigh Valley area and stimulate the desire to search for solutions as

well as taking actions to protect their environment. The description of the nature in the Lehigh Valley area may create a sense of familiarity with local flora and fauna for students internationally, generate associations with and reflections on nature and the environment of their own area, and even trigger their curiosity to investigate and explore the beauty of nature and environmental problems around them.

Apart from its implications for environmental education in general, *The Lehigh Valley: A Natural and Environmental History* is also of great potential values for comparative and international education (CIE). Though issues related to the environment have risen to the top of the public agenda, environmental education has still failed to gain its satisfactory position in the school curriculum (Environmental Literacy Council & National Science Teachers Association, 2007). Because of the global trend to quantify and measure education outcomes via high-stakes testing (Wiseman & Baker, 2005), testing has become “a central preoccupation in the schools” (Ravitch, 2010, p. 7). It is because of the pressure from testing that young people leave school knowing little or nothing about what they need, like environmental literacy, to make “make sense of the world” (Ravitch, 2010, p. 223) and become “an active participant in the great decisions of our time” (Ravitch, 2010, p. 223). This book can be a call for any educational stakeholders, especially who work in the CIE field, to seriously consider the integration of environmental education into the school curriculum so that students can be given the opportunity to learn, explore, and develop the course of action for the things which matter to their world.

As noted by Halma and Oplinger in the book, many of the most intractable environmental issues, such as the changes in the weather patterns, the degradation of soil, air, and water quality, and the loss of habitat, confront us daily directly and indirectly, not only at the local level but also at the international level. Therefore, it is vitally important that students have an understanding of the linkages between natural systems and human activities. Schools can help students make connections between what they are learning in the classroom and problems that affect their lives and help them make the connection from their local community to the global one. Because of pressure from testing and choice which make teachers have to resort to “teaching to the test” and students only concentrate on what is needed to pass high-stakes tests (Ravitch, 2010), it is understandable that environmental education, even if integrated into the school curriculum, is still highly likely to be ignored by teachers and students, and the goal of environmental education which is to raise citizens’ environmental literacy to deal with environmentally related problems would be hard to achieve. Therefore, it is desirable that not only environmental education be incorporated into the school curriculum, but environmental education content and concepts should be assessed in mandated testing as well.

Though there may be environmental education components in the school curriculum, the interdisciplinary nature of environmental education, together with the lack of professional development that in-service teachers are provided to integrate environmental education in the adopted school curriculum, makes teachers reluctant to teach environmental education (Ravindranath, 2007). This book is very helpful for teachers of both natural and social sciences who wish to enhance their interdisciplinary knowledge of the environment in general and that of the Lehigh Valley area in particular and have the desire to boost their expertise in integrating environmental education in their lessons. The complicated interdisciplinary nature of environmental education reflected via the comprehensive description of the natural and environmental history of the Lehigh Valley area indicates that collaboration among teachers of different subject areas for instructional and curriculum decision-making is needed to achieve environmental education curriculum goals. The description of the environmental characteristics and their related issues of the Lehigh Valley also inherently implies that environmental education is convoluted because it requires the knowledge of multiple disciplines. Therefore, in order to

successfully integrate environmental education in the curriculum, it is desirable that teacher professional development programs should be overhauled in which collaboration among teachers of diverse subjects should be emphasized. A new professional development model that pairs teacher groups with math and literacy coaches, which is described in an article by Brown (2016) in *The Washington Post*, can be a model reference for any educational stakeholders, especially education policy-makers, curriculum designers, and designers and trainers in professional development programs who wish to prepare teachers to integrate environmental education in the different curriculum areas.

The book is well-organized and is written in a reader-friendly genre so anyone without specialized background knowledge can read it and have their own takeaway messages depending on how they approach the book. The book serves as a great guide for those who are interested in the natural environment of the Lehigh Valley in particular and in the impacts of humans' activities on the environment in general. Though the book focusses on the environment of the Lehigh Valley area, this book still serves as a great guide for anyone who wishes to investigate, write about, or teach environmental features of a locale, region, or biome. The book is also a great source of reference for policy-makers, researchers, and educators who wish to change educational paradigms as proposed by Ravitch (2011): Students should be given opportunities to learn what is needed for them to make sense of the world. One of them is the environment and its related issues.

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