

## Biodiversity Conservation and Human Health: Exercise

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Source: *Lessons in Conservation*, Vol. 3, pp. 90-97

Published by: Network of Conservation Educators and Practitioners, Center for Biodiversity and Conservation, American Museum of Natural History

Stable URL: [ncep.amnh.org/linc/](http://ncep.amnh.org/linc/)

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# Biodiversity Conservation and Human Health

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# Biodiversity Conservation and Human Health

Andrés Gómez and Elizabeth Nichols

## OVERVIEW

**This Exercise is a practical application of the ideas discussed in the Synthesis and Presentation, focusing on the analysis of a hypothetical potential conflict between biodiversity conservation and human health.**

There are at least five major diseases in Africa that have freshwater snails as intermediate hosts. These diseases are:

1. *Schistosomiasis*: An important parasitic disease of humans that resulted in over 44,000 deaths around the world in 2002; it is caused by a flatworm.
2. *Bovine schistosomiasis*: An important parasite of cattle, which is caused by species in the same genus as the human form of the disease; however, this parasite does not attack humans (i.e., there is no transmission from animals to humans).
3. *Paragonimiasis*: A fluke infection of the lungs that affects an estimated 22 million people worldwide.
4. *Paramphistomiasis*: Caused by a trematode infestation, this is an important disease of domestic cattle and wild ungulates.
5. *Fascioliasis*: A liver fluke that primarily infests cattle and sheep.

An understanding of the basic biology of a disease is critical for understanding how it affects humans, and how the transmission cycle is affected by other components of biodiversity. Here, we will use schistosomiasis as a model to describe the relevant life cycle and epidemiology for this group of related diseases.

Schistosomiasis (also known as bilharzia) is often a chronic illness caused by several species of parasitic flatworm in the genus *Schistosoma*, which are collectively known as schistosomes. It is estimated that over 250 million people worldwide carry this disease, especially in tropical countries in South America, Africa, and Asia. The symptoms of schistosomiasis include pain, fever, diarrhea, and fatigue, and can also lead to other symptoms in the digestive, urinary, and central nervous systems. It can be treated by a single oral dose of a common anti-parasite drug.

Schistosomes cycle in a snail-human life cycle (Figure 1). Snails belonging to three genera (*Biomphalaria*, *Bulinus*, and *Oncomelania*) are the obligate intermediate hosts. Humans become infected through the skin with the parasite's infective life stages (known as cercariae), while swimming or wading in bodies of water with infected adult snails (see Stage 6 in Figure 1). Uninfected snails become infected when untreated human excreta containing eggs reach water bodies (see Stage 10 in Figure 1). The life cycle therefore has three main components: 1) in water, where eggs are released and subsequently hatch; 2) in the intermediate hosts, the early stages of the parasite mature inside the snails; and 3) in the final host, when cercariae infect humans and cause the disease. The disease can be controlled by stopping the transmission cycle at any of the stages of the cycle.

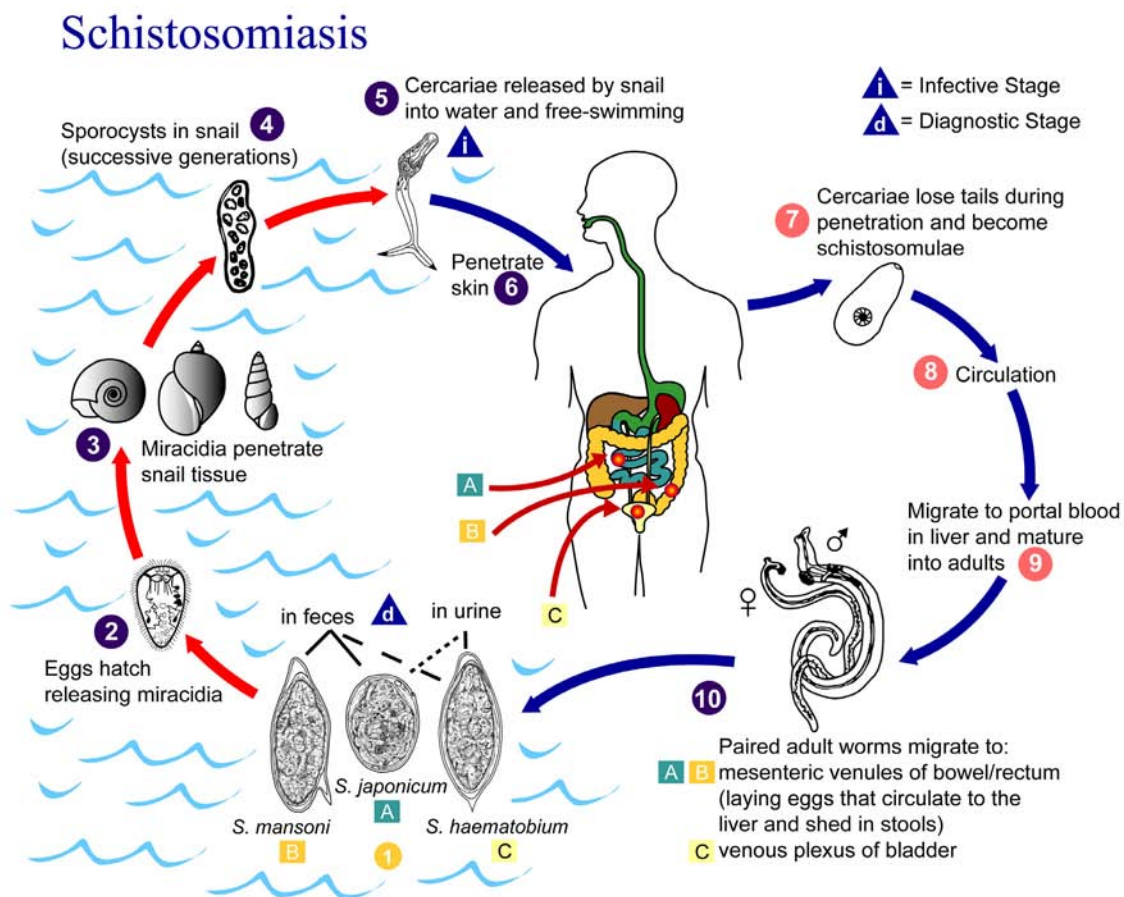


Figure 1. Schistosomiasis Life Cycle. This image was produced by the United States Department of Health and Human Services and is in the public domain.

**OBJECTIVE**

The objective is to analyze the human health and conservation implications of a common public health strategy.

**PROCEDURE**

You are the scientific advisor to the Minister of the Environment in an East African nation. A recent outbreak of schistosomiasis, both in humans and in cattle, has devastated several provinces across the country.

The Minister of Health has just offered the President a proposal to control the disease outbreak through widespread snail control across a series of natural and man-made waterways. Your employer (the Minister of the Environment) has asked you to provide a brief outlining the impacts of the proposed spraying. Specifically, she is interested in understanding the consequences of the plan on human health and biodiversity. The Minister suspects that, although the proposed plan will be effective in controlling these diseases, biodiversity, ecosystem functioning, and human health may be negatively affected by it, and thus an alternative plan would be ultimately preferable.

To better prepare your case, you have also been provided with the summary the Health Minister presented to the President:

*In light of the burden on human and animal health, and the economic consequences of snail-borne diseases, it is the position of the Ministry of Health that a major control strategy should be undertaken immediately. We propose the widespread use of synthetic molluscicides along the four major watersheds of the country in order to eliminate the snails that act as intermediate hosts for these parasites. This will be a multi-year, multi-million dollar project that will continue until the prevalence of these five diseases has diminished significantly, and may be reinstated at any point where high incidence of any of these diseases is seen to increase. The economic losses caused by these diseases (measured in the costs of treatment, lost wages due to illness, and losses in productivity in livestock ranches) justify this measure and the control of such costs will offset the expenses for this program.*

You will write a two-page maximum policy brief for the Minister of the Environment analyzing the implications of the proposed spraying. The Minister will use your brief for her talking points in arguing against the Minister of Health's proposal. Your final product should contain:

1. A short analysis on the implications for biodiversity in the country
2. A concise explanation of the ways the plan will negatively impact overall health
3. An alternative control strategy

Use the information provided in the *Biodiversity Conservation and Human Health* lecture,

the attached memo on “How to Write a Policy Brief,” and the following additional resources to construct your arguments. You are encouraged to complete your picture of this imaginary country with any information you decide is relevant. For example, your group may include in the analysis that distinctive snail shell ornaments are very important for the cultural identity of the country’s minorities, that snails are a significant protein source, or any other social, political, or economic factor that may be helpful in constructing a well-reasoned reply. If you make any such assumptions, be sure you define them, and logically connect them to your broader argument when you write your policy brief.

In addition to the relevant linkages outlined in the *Biodiversity Conservation and Human Health* lecture and synthesis, some points you may consider when doing your analysis include, but are not limited to:

- The effects of the plan on snail species (and other fauna) not involved in disease transmission.
- Ecosystem-wide consequences; e.g., what would happen to species that are above (such as fish) or below (such as plants) snails in the food web? What would be the consequences for ecosystem function? Which of these functions can impact human health?
- The effects of the molluscicides themselves.
- The estimated 2/3 of the 330 snail species in Africa that are under some level of threat (Kristensen and Brown, 1999); you may assume that 2/3 of the snail species in your country are threatened as well.

## **THE POLICY BRIEF<sup>i</sup>**

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### **Overview**

The policy brief is a document, which outlines the rationale for choosing a particular policy alternative or course of action in a current policy debate. It is commonly produced in response to a request directly from a decision-maker who intends to advocate for the position detailed in the brief.

The brief may provide a targeted discussion of the current alternatives without arguing for a particular one or focus directly on providing an argument for the adoption of a specific policy alternative. In either case, as any policy debate is a marketplace of competing ideas, the purpose of the policy brief is to convince the target audience of the urgency of the current problem and the need to adopt the preferred alternative or course of action outlined and, therefore, serve as an impetus for action.

The most common audience for a policy brief is the decision-maker, but it is also not unusual to use the document to support broader advocacy initiatives targeting a wide but knowledgeable audience (e.g., decision-makers, journalists, diplomats, administrators, researchers). The policy brief is usually said to be the most common and effective written communication tool in a policy campaign. However, in balancing all of the criteria below, many analysts also find the brief the most difficult policy tool to write.

An effective policy brief is typically:

**Focused** – All aspects of the policy brief (from the message to the layout) need to be strategically focused on achieving the intended goal of convincing the target audience. The argument provided must build on what they do know about the problem, provide insight about what they don't know about the problem, and be presented in language that reflects their values, i.e., using ideas, evidence, and language that will convince them.

**Professional, not academic** – The common audience for a policy brief is not interested in the research/analysis procedures conducted to produce the evidence, but is very interested to know the writer's perspective on the problem and potential solutions based on the new evidence.

**Evidence-based** – The policy brief is a communication tool produced by policy analysts and, therefore, all potential audiences not only expect a rational argument, but will only be convinced by argumentation supported by evidence that the problem exists and the consequences of adopting particular alternatives.

**Limited** – To provide a comprehensive, yet targeted argument in limited space, the focus of the brief needs to be limited to a particular problem, or area of a problem, and succinct in achieving its goals.

**Understandable** – This not only refers to using clear and simple language (i.e., not the jargon and concepts of an academic discipline), but also to providing a well-explained and easy to follow argument targeting a wide, but knowledgeable audience.

**Accessible** – the writer of the policy brief should facilitate the ease of use of the document by the target audience and, therefore, should subdivide the text using clear descriptive titles to guide the reader.

## COMMON STRUCTURAL ELEMENTS OF A POLICY BRIEF

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As discussed above, policy briefs directly reflect the different roles that the policy analyst commonly plays, i.e., from researcher to advocate. The type of brief that we are focusing on is one from the more action-oriented, advocacy end of the continuum. Although there is much variation even at this end of the scale, the most common elements of the policy brief are as follows:

### *Title*

The title aims to catch the attention of the reader and compel him/her to read on, and so needs to be descriptive, punchy, and relevant.

### *Context and importance of the problem*

The purpose of this element of the brief is to convince the target audience that a current and urgent problem exists, which requires them to take action. The context and importance of the problem is both the introductory and first building block of the brief. As such, it usually includes the following:

- A clear **statement of the problem or issue** in focus
- A short **overview of the root causes** of the problem
- A clear **statement of the implications** of the problem

### *Critique of policy option(s)*

The aim of this element is to detail shortcomings of the current approach or options being implemented and, therefore, illustrate both the need for change and the focus of where change needs to occur. This section may contain:

- A short **overview of the policy option(s)** in focus
- An **argument illustrating why and how** the current or proposed approach is failing; it is important, for the sake of credibility, to recognize all opinions expressed in the debate of the issue

### *Recommendations*

The policy alternatives you are advocating.

## LITERATURE CITED

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### *Sources consulted or recommended*

Kristensen, T. K. and D. S. Brown. 1999. Control of intermediate host snails for parasitic diseases - A threat to biodiversity in African freshwaters? *Malacologia* 41:379-391.

<sup>i</sup> This description of the policy brief was modified from Young and Quinn (2004) (<http://www.policy.hu/ipf/fel-pubs/samples/PolicyBrief-described.pdf>)



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This material is based on work supported by the National Science Foundation under the Course, Curriculum and Laboratory Improvement program (NSF 0127506).

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