

In public discourse on the environment, scientific knowledge is often mediated by metaphors. In this article, the authors are concerned with the role of metaphors in the communication of biodiversity loss. More specifically, their examination focuses on such popular metaphors as "the library of life," "biotic holocaust," and "the Holy Grail" and on the role of these metaphors in putting biodiversity loss on the global environmental agenda. These metaphors reflect two opposite narratives on environmental politics: the apocalyptic narrative of species extinction and the new narrative of hope that looks at genetic engineering.

From "Burning Library" to "Green Medicine"

The Role of Metaphors in Communicating Biodiversity

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In public discourse on the environment, scientific knowledge is often mediated by metaphors. Forests are "the lungs of the Earth," global warming is causing a "greenhouse effect," biodiversity is "the library of life," and nature conservation is an ongoing effort to protect "the common heritage of humankind." Metaphors are also used to give names to environmental problems, such as "acid rain" and the "ozone hole."

One of the reasons why metaphors are needed is that most environmental problems are not immediately apparent to the human observer. For instance, the detection of ozone depletion or global climate change requires highly sensitive and sophisticated technical machinery, scientific theories, and

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mathematical models. We need metaphors such as the “ozone hole” and the “greenhouse effect” to understand what exactly is happening.¹ But metaphors also evoke strong emotions; powerful images and emotions are a pervasive feature of environmental discourse.

There are two main types of metaphors in the debate on environmental problems. Martial metaphors and images of destruction evoke emotions of fear and call for rapid action to save the environment. Since the 1960s, the protection of our natural environment has often been described as a war or a battle; witness “the war against nature,” “the battle over nature,” and “the population bomb.”² These martial metaphors and apocalyptic views are based on the contradiction between humans and nature or, more particularly, between the economy and the environment. On the other hand, these metaphors of catastrophe have been accompanied since the 1980s by metaphors of “sustainable development” or “ecoefficiency.” Unlike martial metaphors, these metaphors are used to build connections between the environment and the economy, to point out that we are all “in the same boat” and that we all stand to gain from conservation. This approach evokes feelings of hope and creates cohesion.

Most of the metaphors used in the environmental debate originate in the domain of science but gain popularity through repetition in the mass media. Metaphors are an integral part of journalistic practice in the mass media. To get the attention of their audience, the mass media need a tool with which to transmit new information in a familiar format. Metaphors offer a way of understanding new issues and complex processes in terms of shared experiences. They gain their resonance from connections to frequently used frames and narratives, such as defining politics as a war, game, or trade-off or defining scientific practice as a journey to the unknown. These kinds of metaphors give narrative continuity to news stories and political debate, resonating with culturally shared beliefs. In this way, metaphors are used to connect new environmental problems to previous ones, scientific issues to popular images of science, and science to politics and to everyday life.

This study is concerned with the investigation of these communicative and political uses of metaphors. More specifically, we analyze some of the most popular metaphors used in the public debate on biodiversity in the 1990s, and the role of these metaphors in putting biodiversity loss on the global environmental agenda. We argue that metaphors have played an important role in popularizing the problem, connecting biodiversity to previous environmental problems and, in particular, evoking images and emotions for biodiversity conservation.

Metaphors in Science Communication

Metaphors are an integral part of our conceptual system; they affect the way we think and behave. In essence, metaphors are about “understanding and experiencing one kind of thing in terms of another” (Lakoff and Johnson 1980:5). More precisely, a metaphor consists of a source domain, one or more target domains, and a mapping between these domains. For example, biodiversity is often metaphorized as “a library of life.” In this metaphor, some aspects of the source domain (i.e., the library)—such as a collection of knowledge and information—are transferred to the target domain (i.e., biodiversity). The idea of biodiversity becomes easier to understand.

Metaphors are important tools of communication in scientific thinking and writing (e.g., Black 1962; Hesse 1970), in interaction between scientific and other discourses (Bono 1990; Maasen 1994), and in everyday discourse (Lakoff and Johnson 1980). Some recent accounts of the role of metaphors in social and cultural studies of science have described metaphors as “media of exchange” (Bono 1990) and “messengers of meaning” (Maasen 1994; Maasen and Weingart 1995, 2000) between different disciplines, discourses, and other social contexts. Metaphors have an important role to play in the communication between different disciplines and in the interaction between science and society at large.³ On account of their familiarity, or at least their ability to evoke commonly shared meanings and feelings, metaphors serve as “common ground” for interdiscursive exchange and communication. This makes metaphors not only figures of speech but also constitutive elements of argumentation in science communication (Bucchi 1998; Väliaverronen 1998).

In this article, we are not concerned with the role of metaphors in disciplinary or interdisciplinary settings. Instead, we focus on the functions of metaphors in communicating scientific ideas to the public.⁴ Scientists may use metaphors for purposes of popularizing complex issues, promoting certain views, and justifying scientific research. The ability to evoke powerful images and emotions may be crucial in the political and public arenas in building up the crucial link on one hand between scientific knowledge and political action and on the other hand between scientific knowledge and popular images. Furthermore, metaphors help create continuity from previous issues and frames to current ones, which is important for making issues public. The meanings of metaphors are culturally produced and depend on the wider context of use and the purposes of the users (Chiappe 1998; Hellsten 2000). The context of use may be the realm of science or journalism, for instance, and the purpose of a user might be to promote science, to justify the

conservation of biodiversity, or to concretize and popularize a scientific issue to lay people.

To understand the functions of metaphors, we need to consider them in a broader discursive context rather than simply examine the possible meanings of certain terms. For instance, the functions of “acid rain,” the “ozone hole,” or the “greenhouse effect” as metaphors depend largely on how they are interpreted as symbols of the “environmental crisis” or the particular ways in which that crisis is dealt with. This kind of metaphorization refers to the “topicality” (Myerson and Rydin 1996) or the “emblematic” (Hajer 1995) nature of environmental discourse. Environmental discourse proceeds mainly through certain major topics or emblems, which function as metonyms for the general global threat to the environment. New topics introduce new ways of speaking and arguing (i.e., new discourses), but there is also obvious continuity between different topics, and this continuity manifests itself in metaphors (see, e.g., Hellsten 2000; Väliaverronen 1998; Weingart, Engels, and Pansegrau 2000; Weingart and Pansegrau 1999).

The Rise of Biodiversity on the Public Agenda

Biodiversity was officially acknowledged as a global environmental problem for the first time at the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992. Together with global warming, biodiversity was the main issue on the agenda of the meeting and in public debates surrounding it. During the conference, the Convention on Biological Diversity was signed by 155 states. The document forms a basis for monitoring and conservation programs as well as for various research programs at the level of nation-states. George Bush, President of the United States, provided good publicity for the issue by expressing his reluctance “to save squirrels if it costs one American job” (Jeffries 1997:1).

The concept of biological diversity can be traced back to the late 1970s and early 1980s and to the emergence of conservation biology (Hannigan 1995; Jeffries 1997). Conservation biology was formally recognized as a discipline in 1985, with the creation of the Society for Conservation Biology. However, it was only with the coining of the neologism *biodiversity* in 1986 that the concept was more widely adopted in the scientific literature. Today, the two terms are used synonymously, although *biological diversity* may have a more “scientific flavor” than its popular abbreviation (Kaennel 1998:74).

The term *biodiversity* first appeared as an abbreviation of *biological diversity* in the National Forum on BioDiversity (see Wilson 1988), organized in Washington, D.C., in September 1986. The forum was “an explicitly political event” (Takacs 1996:37), and the shorthand, which quickly established itself without the capital *D*, was purposefully invented and addressed to the U.S. Congress and the general public. The forum gained a lot of publicity in the U.S. media through such prominent spokespersons as Paul Ehrlich and Edward O. Wilson. They and some other well-known scientists called themselves the Club of Earth and announced that “the species extinction crisis is a threat to civilization second only to the threat of thermonuclear war” (Mazur and Lee 1993:704). Biodiversity loss aroused public interest also because mass extinction had become a public topic just one year previously with the introduction of new asteroid theories to explain the fate of dinosaurs.

Two issues closely linked to biodiversity, namely, the mass extinction of species and the rapid destruction of rainforests, had emerged as popular topics, at least in the U.S. media, by the late 1980s (Collins and Kephart 1995; Mazur and Lee 1993). Biodiversity as an issue was also being slowly imported to Europe, and the year of the Rio conference saw the level of media attention to biodiversity reach new heights. Since then, the issue has been firmly established on the public agenda (Väliaverronen 1998). The popular context for biodiversity as a new environmental problem was formed by the destruction of rainforests, climate change, and species extinction. Many of the metaphors used in the biodiversity debate are borrowed from another environmental problem, overpopulation. “Once again we are depicted as rapidly approaching the ‘limits of growth,’ thereby running the risk of surpassing the ‘carrying capacity’ of the planet” (Hannigan 1995:155).

Scientists, particularly conservation biologists, have played a major role in the construction of the biodiversity crisis as a new environmental problem. Conservation biologists took it as their mission to craft and sell “the tools that will make the Earth sustainable for biodiversity” (Takacs 1996:6). However, this would not have succeeded without the growing economic significance of biotechnology. The financial value of genetic resources has been widely recognized through intellectual property rights, and new developments in biotechnology have paved the way for the use of biodiversity as a new type of natural resource (Hannigan 1995). The interests of large multinational corporations and new trends of economic globalization had a major impact on the United Nations biodiversity convention.

Popular Metaphors of Biodiversity

In the scientific literature and the mass media, metaphors of biodiversity range from portrayals of a biholocaust and Armageddon to such phrases as "the library of life," "the museum of life," "the common heritage of humankind," "a web of life," "bioremediation," "green medicine," and "the Holy Grail." These metaphors reflect two different types of environmental rhetoric: an apocalyptic view of species extinction and a view that stresses the economic benefits of biodiversity conservation. In the words of Myerson and Rydin (1996:73), elegiac rhetoric "mourns the lost worlds of the Earth," while ameliorative rhetoric focuses on the richness of the protectable world.

The close links of biodiversity with the new discipline of conservation biology set it apart from earlier big environmental issues. After the big "pollution issues" such as acid rain, ozone depletion, and climate change, biodiversity also highlights the variety and beauty of nature. Significantly, this rhetoric uses the language of frontier development, referring for instance to "biotic exploration" or "bioprospecting" (Reid et al. 1993). This positive popular image of biodiversity is reinforced by the fact that the debate on biodiversity seems to lack the controversies typical of other major environmental issues. This does not mean to say that the discussion on various aspects of biodiversity is consensual (Baumann et al. 1996; Myerson and Rydin 1996; Shiva 1993; von Weiszäcker 1996). However, the popular image of biodiversity has not been affected very much by potential sources of controversy on issues such as development and democracy, North-South relations, property rights, the rights of indigenous peoples, ecotourism, or biotechnology.

Also, in contrast to forest destruction and acidification, which have been symbolized by images of skulls painted on tree trunks, or climate change, which has been symbolized by smokestacks and temperature charts, the destruction of biodiversity has had no distinctive symbol of its own. It has proved immensely difficult to popularize and visualize this particular problem. Perhaps the most common approach is to refer to endangered species (Mazur and Lee 1993), which links the problem with earlier environmental thinking and its imagery. Many conservation organizations, for instance, have used large endangered species, such as pandas, tigers, whales, and elephants, in their symbols. These "charismatic" and "photogenic" species have become familiar to us not only in advertisements and news pictures but also in picture books, magazines, and above all in nature documentaries. Images of burning rainforests have also been used to symbolize biodiversity loss. These problems in visualization have made metaphors vitally important in creating the public imagery of biodiversity.

The Library is on Fire

In the mass media, biodiversity is often metaphorized as a collection of valuables, most notably as a library of life. This metaphor builds on the ancient metaphor of the “book of life,” which is currently very popular in descriptions of genetics (Kay 1999). In this metaphor, genes are the alphabet in the book of life and species the books in the library. The metaphor of a library provides a concrete image of biodiversity. Wilson (1992:166) illustrated the extent of this diversity by using the metaphor of a library. According to his calculations, if there were 100 million species in the world, it would take a mid-sized library to contain all the information.

The idea of biodiversity as a library opens up two important perspectives. First, it defines biodiversity in terms of information. This is linked to a new trend in scientific practice in various disciplines, as observed by Bowker (2000): “Increasingly, the database (the information stored) is seen as an end in itself. According to most practitioners, the ideal database should be theory-neutral, but should serve as a common basis for a number of scientific disciplines to progress” (p. 643). Bowker’s primary examples are the human genome initiative and biodiversity mapping, in which scientific practice is defined mainly in terms of information storage and transmission.

This notion of biodiversity has inspired a number of research projects concerned with surveying and classifying all forms of life on Earth (e.g., Heywood and Watson 1995), and evoked the old obsession of botanists and zoologists with classification and taxonomy (Mayr 1982). The idea of biodiversity as information represents scientists as collectors and librarians whose heroic task it is to “expand laterally to get on the with the great Linnaean enterprise” (UK Systematics Forum 1998:25) and catalog all life on earth. This metaphorical discourse on nature as a library of valuable information binds together biodiversity conservation and management of the issue. It portrays scientists, conservation biologists, and taxonomists as the only people who can collect, catalog, and read the information stored. Thus, issue advocacy is connected with expert advocacy (Haila 1999).

The metaphor of a library has also been used to call for political action. For example, Ehrlich (1992) elaborated the metaphor:

Innumerable potential new foods, drugs and useful products may yet be discovered—if we do not burn down the library first. . . . In fact, the very basis of our civilization—our crops, domestic animals and many of our medicines and industrial products—have been derived from the planet’s vast genetic library. (P. 12)

This is a very powerful image of destruction: biodiversity is constitutive to civilization, and if that is under threat, we need to take immediate action. Murray (1993) used the same metaphor to evoke emotions of fear:

Conversion of rainforests for other uses has been likened to burning libraries full of volumes that have not even been read. And in reading through a genetic library, it is not just the painstaking mapping of genes that is revealing but elucidation of many varied and surprising interactions between species. (Pp. 77-78)

The idea of a library on fire adds an emotional appeal to the debate.

This idea of a burning library has been widely circulated in the press. In an article entitled "Taxonomy, Lacking in Prestige, May be Nearing a Renaissance" (Luoma 1991), Donald Falk, executive director of the Center for Plant Conservation, was quoted as saying, "We have a situation where our library of life is being burned at a phenomenal rate—and we have only a small number of people who know how to read what's left" (p. C4). Similarly, Dr. Dan Janzen, professor of biology at the University of Pennsylvania, was quoted in a piece entitled "Monumental Inventory of Insects in a Costa Rican Forest is Under Way" (Yoon 1995) as comparing conserved areas to "national greenhouses full of products that make them worth saving. 'As I see it, it's as though we had the Library of Congress and we'd read 10 books out of it'" (p. C4).

A second important perspective is the connection between biodiversity and the arts, which has been used for purposes of political mobilization. Compared to the information perspective, this connection between biology, science, and the arts relies on the discourse of scarcity instead of the discourse of richness, and it was manifested in a metaphor of a museum on fire, the "Louvre of biodiversity burning" (e.g., Weiszäcker 1996:60). In a book review of *The Diversity of Life* (Wilson 1992), Professor David Papineau (1992) drew a comparison between biodiversity and the arts:

The diversity of nature is as much part of our heritage as paintings and buildings. It may not be our own creation, but it is an essential part of the world that nurtures us and makes us human. We quite rightly go to great lengths to preserve the Pantheon and the Mona Lisa. (P. 7:1)

The destruction of unique pieces of art appeals to feelings of responsibility to save things for future generations. The library and museum metaphors were purposefully used to evoke powerful emotional images of destruction, to call for action for biodiversity conservation, and to emphasize the role of scientists as experts in this process.

The metaphors of a library and a museum also gained in popularity as they appeared in wider environmental narratives of extinction crisis and apocalypse. The debate on the extinction crisis and the apocalyptic view of nature were introduced by Ehrlich, Myers, and Wilson, who were also active in introducing biodiversity loss. For example, in an article entitled “World Losing Three Species Every Hour” (Radford 1995), the apocalyptic view was explicitly connected to calls for action:

The earth is losing species at a rate unparalleled in human experience. . . . We biologists, alarmed at this imminent ecological Armageddon, have been increasingly casting ourselves in a Paul Revere mode, trying as best we can to raise the alarm to our fellow citizens. (P. 8)

Wilson used the metaphor of a holocaust for similar ends in an article entitled “Species Loss: Crisis or False Alarm?” (Stevens 1991): “The resulting mass extinction . . . is likely to compare with the largest extinctions in geological history and to take place in much shorter time: decades, perhaps, instead of centuries and millennia. It is a genuine holocaust” (p. C1). Similarly, Myers (1993) used the metaphor of a “biotic holocaust” in his article “For Dear Life” to describe the irreversible nature of the environmental crisis.

Another feature of this apocalyptic rhetoric is what Myerson and Rydin (1996) called emotive objectivity:

There is objectivity in the sense that here are the facts, the figures, the mechanics. But the objectivity is emotive, inherently emotive: the facts are disturbing in themselves, the trends are alarming themselves. The emotion is not personal; it is the facts that are shown to provoke the feeling. (Pp. 137-38)

This rhetoric was widely used in discussing the rate of species extinction: “World Losing Three Species Every Hour” (Radford 1995) and “Alarm Grows as Mankind Wipes out Species in Their Thousands” (Radford 1997, reporting on a study by Ehrlich et al. in the journal *Science*). “Emotive objectivity” is used strategically in letting the facts speak for themselves. The metaphors of a library and a museum concretize biodiversity loss, and when connected to the powerful image of uncontrolled fire, they call for immediate action. Metaphors of a library and a museum gained their popularity by connecting biodiversity to a series of other global environmental issues, such as the extinction of dinosaurs and overpopulation.

At the same time, biodiversity was also metaphorized as a web and network of relations between humans and nonhumans. This metaphor was used in the scientific literature, appearing in book titles such as *Losing Strands in the Web of Life* (Tuxill 1998) or *The Web of Life: A Strategy for Systematic*

Biology in the United Kingdom (UK Systematics Forum 1998), as well as in the mass media. The idea of nature as a complex set of relations is usually attributed to Darwin and his *On the Origin of Species*. Darwin focused on the competitive struggle for existence, but others have emphasized cooperation and community in maintaining the web (e.g., Muir 1994). The idea of a web as a set of relations and mutual dependency is also extended to human relations as well as to relations between humans and nature.

The idea of biodiversity as a rich web of relations highlights nature as a system of relations instead of a library or museum “out there.” In an article entitled “Till Death Us do Part” (Radford 1994), this idea was formulated into a web of life: “As zoologists and entomologists warn of destruction, they discover the web of life is richer and more complex than they ever believed possible” (p. S6). However, this metaphor did not gain very much popularity.

While the metaphor of a library is easy to fit in with powerful images of fire and other images of destruction that call for rapid action, the metaphor of a web remains more detached. This possibly had to do with the passive nature of the metaphor itself in relation to public activity. As Muir (1994) noted, “The population bomb is ticking, the spaceship is flying, the book is open, but the web exists” (p. 151). *Web* and *net* do not evoke powerful images of irreversible loss, nor do they evoke emotions of losing something unique. In connection to library and museum, richness is something concrete and economically valuable, but in connection to relations and variation in nature, it may remain abstract. Biodiversity loss is not based on dramatic environmental catastrophes, and it is perhaps because of this that there is a need for metaphors that evoke powerful images and emotions to inspire political mobilization and to attract the interest of the mass media.

Promoting the Issue: Biodiversity as Green Medicine

Provocative images of fire, holocaust, and the destruction of the *Mona Lisa* have characterized the use of metaphors in political mobilization. These images of fear are useful in calling for rapid action. However, the promotion of issues and scientists’ efforts may also be based on images of hope. “Running parallel to this ‘doomsday’ rhetoric is a second type of claims language which stresses the positive economic benefits of preserving diverse habitats” (Hannigan 1995:155-56). Thus, environmental protection has been redefined in terms of a positive-sum game instead of a zero-sum game.

According to Maarten Hajer (1995), these shifting emphases are related to changes in environmental policy that he calls the process of ecological

modernization. Whereas the environmental debate used to revolve around fundamental conflicts, the discourse of ecological modernization aims specifically to resolve these conflicts or at least to push them into the background. The best-known background text for this new discourse is the Brundtland Commission's report *Our Common Future* (World Commission on Environment and Development 1987), in which the term *sustainable development* was coined and new directions for environmental policy thinking were set out. The concepts of sustainable development and ecological modernization bear a close resemblance to each other, even though both have been interpreted in various ways. The breakthrough for both came at a stage when environmental issues were increasingly defined in terms of global problems (Lewis 2000; Macnaghten and Urry 1998). What we have seen at a rhetorical level is a shift in emphasis from conflicts to consensus, to the reconciliation of economic and environmental considerations. "Overcoming the polarity" (Myerson and Rydin 1996:27) has become an important rhetorical feature of environmental discourse.

The integration of environmental protection with economic growth was a prominent theme at the Rio summit. Not only did the Biodiversity Treaty reflect concerns about the extinction of species and the destruction of their habitats, it also reflected the interests of the global economy and, more specifically, of biotechnology industries. An important part of the treaty was the protection of genetic diversity and the distribution of the profits gained from genetic material between Western industrial countries, rich in economic terms but poor in biodiversity, and developing countries, poor in economic terms but rich in biodiversity (Baumann et al. 1996; Hannigan 1995).

This kind of ecomodernist discourse was also promoted by such metaphors as "drugstore" and "green medicine," which were used to connect nature conservation to its economic values in the biodiversity debate. The idea of biodiversity as an important economic resource is often connected to the idea of sustainability: "One aspect of the process of changing government and popular perceptions about biological resources is to show that the sustainable use of biodiversity has positive economic value" (Pearce and Moran 1994:15). The benefits of conserving biodiversity were calculated as investments in an article entitled "328 Useful Drugs Are Said to Lie Hidden in Tropical Forests" (Cheng 1995): "One of the companies combing through the forests is Merck & Company, which has invested \$2 million since 1991 in the National Biodiversity Institute in Costa Rica to hunt through the country's biological resources for new medicines" (p. C4).

Myers (1995) highlighted the economic values of what he called "bioremediation":

Micro-organisms could help us clean the world, but many are under threat . . . In Europe, and with regard to soil clean-up costs generally, the overall market for bioremediation and associated technologies is likely to exceed \$30bn over the next 10 years (by contrast with \$1bn so far) . . . All in all, and counting every potential application in light of our present knowledge and understanding, we can reckon that within 10 years, the world-wide market for bioremediation could total at least \$11.5bn, by contrast with the current global market of only \$100m. (P. 8)

This idea of bioremediation concretizes the need for biodiversity conservation—and justifies the work of conservation biologists and ecologists. It promotes the issue of biodiversity conservation, which in turn is crucial in putting the issue on the global environmental agenda.

Popular metaphors of biodiversity as a repository and treasury put forward the idea of ecological modernization and ecological sustainability. In a piece entitled “Survival Has Become a Matter of Economics” (Evans 1993), richness was connected to bioindustries: “the pharmaceutical industry is prospecting as never before for untapped biological richness—of which less than 1 per cent has been scientifically investigated. The search is for raw materials for the next ‘green’ revolution” (p. 19). Biological richness is the Holy Grail of biodiversity and the research object of biobusiness.

This richness was also discussed in terms of gold and treasures. As it was put in a news article entitled “U.S. to Reject Pact on Protection of Wildlife and Global Resources” (Schneider 1992): “Mother Nature is Costa Rica’s gold” (p. 1:1). The *Guardian*, however, took a sharply critical view on biodiversity as a mere collection of economically valuable resources in a piece entitled “Environment Post Rio: What Is This Thing Called Life?” (Evans 1992). Evans, the director of Plantlife, used the metaphor of heritage to criticize the view of nature as a store:

The danger is that all this talk of ecology, natural resource and so on becomes jargon which continues to make nature abstract, a phenomenon ‘out there’, like the environment. . . . Trying to preserve nature as heritage, a resource for future generations modeled on nostalgic, picturesque notions of countryside, only results in the creation of a theme park, a sort of Bio-Disney. (P. 23)

The criticism points to defining heritage as a resource and preserving samples of species for future generations instead of conserving ecosystems and habitats.

The idea of ecological modernization was also connected to the idea of biodiversity as the common heritage of humankind. The metaphor of “common heritage” is based on a global perception of environmental issues, understanding the planet Earth as a single entity. First, it was used in relation

to conserving areas beyond the confines of national jurisdiction, such as the seabed and subsoil, the Moon and other celestial bodies, and the Antarctic.

The phrase “the common heritage of mankind” acquired a new public and international profile during the 1960s. In 1967 Arvid Pardo, Malta’s ambassador to the United Nations, first proposed that the deep seabed should be the common heritage of mankind. The “common heritage” principle has since been incorporated in the 1982 Convention on the Law of the Sea and also, interestingly, in the new Moon Treaty. (Gray 1993:168)

Used in the biodiversity debate, this metaphor implies that biodiversity is one of the international commodities that can be exploited to a certain extent but still needs to be preserved for future generations. In this sense, it comes very close to the idea of sustainable development. Our common heritage should be looked after in a sustainable manner—which is economically beneficial to everyone.

Discussion: The Role of Metaphors

Metaphors are important mechanisms of mediation and communication because of their ability to evoke concrete images and appeal to emotions. Scientists use the emotional appeal of metaphors for purposes of popularizing complex issues, promoting certain views, and justifying the work they do. In the political and public arenas, metaphors build up the crucial link between scientific knowledge, political action, and popular acceptance of this action by evoking powerful images and emotions. In addition, for the mass media, metaphors offer continuity between previous issues and frames.

In the biodiversity debate, metaphors have been used as tools of communication in two ways: by evoking powerful images of destruction and by appealing to the sense of a common planet and responsibility for maintaining this common heritage. First, the metaphor of “a library of life” served the interests of scientists, journalists, and politicians. For scientists, it served as a tool for defining biodiversity in terms of information, thus providing a basis for new research programs, while for others it was mainly a means of popularization. This metaphor was also used to call for action, and in the media, it gained popularity from the apocalyptic narratives of collapsing nature. Second, the metaphor of “green medicine” appealed to the shared feelings of saving the planet for its economic benefits. It was also used to popularize the issue and to promote the ideas of ecological modernization.

As communicative devices, metaphors may prove to be useful for purposes of opening scientific and other specialist fields to public discourse and

deliberation. This may be indispensable in the effort to solve such complex scientific, technical, and social problems as those involving threats to the environment. However, this virtue may also turn into a vice. Metaphors can also be used as a means of reinforcing scientific and professional authority or promoting certain political, economic, or other interests. While offering emotive images of destruction and hope, these metaphors also strengthen the role of scientific expertise in environmental politics.

In conclusion, the biodiversity debate fluctuated between two types of environmental rhetoric, and this fluctuation was also reflected in the metaphors that were used. The apocalyptic rhetoric, manifested in metaphors such as “the library of life is on fire,” a “holocaust,” and “Armageddon,” was established on the basis of images of fear and destruction. At the same time, there was a shift in public discourse toward a “rhetoric of hope” that made use of economic metaphors and consensual language. This market-based win-win environmentalism (Livesey 1999) was manifested in metaphors of “green medicine” and the “Holy Grail,” and it was aimed at promoting the positive values of biodiversity conservation. It is particularly noteworthy that both sets of metaphors gained their popularity as parts of existing narratives that are able to build connections across discourses and topics and evoke strong images and feelings. Both narratives and subsequent metaphors helped turn the complex issue of biodiversity loss into an easily digestible slogan and legitimize the issue on the public agenda.

Notes

1. Abstract problems and risks are concretized and simplified by means of not only metaphors but also visual elements such as photographs and television images.

2. Some analysts of environmental discourse have argued that this kind of polarizing and dramatizing rhetoric may be one of the main obstacles to agreeing on environmental politics (e.g., Killingsworth and Palmer 1992). This may be partly true. However, it is obvious that far more is involved in the unresolvability of environmental disputes than the use of polarizing rhetoric and martial metaphors (cf. Myerson and Rydin 1996).

3. This approach differs from a more linguistic notion of metaphor in that it aims to analyze metaphor within a broader context of cultural narratives, frames, and discourses and comes closer to anthropological accounts of metaphor use (e.g., Fernandez 1991). In this study, we conducted the metaphor analysis in three steps. First, we identified the most common metaphorical expressions used in popularizing and promoting the biodiversity issue. Second, we organized these expressions as parts of the relevant conceptual metaphors used in the public discourse. Third, we put the metaphors into the context of wider cultural narratives.

4. Empirical examples for this study are drawn from the main scientific books and articles on biodiversity and from coverage of biodiversity from 1990 to 1997 in two newspapers: Britain's

Guardian and the *New York Times*. We searched all the articles containing the term *biodiversity* or *biological diversity* in electronic archives and then collected the stories from the library. Biodiversity did not attract very much public interest before 1992, despite the successful launch of the term in the U.S. media in 1986 (cf. Collins and Kephart 1995). Since 1996, it seems that the biodiversity issue has lost some of its popularity in the news media (Välvirronen 1998). Although our decision to concentrate on two "quality" newspapers has its limitations, this examination nevertheless provides a window on the use of metaphors in communicating biodiversity. A more comprehensive analysis of the use of metaphors in the press was beyond the scope of this study.

References

- Baumann, M., J. Bell, F. Koechlin, and M. Pimbert, eds. 1996. *The life industry: Biodiversity, people and profits*. London: Intermediate Technology.
- Black, M. 1962. *Models and metaphors: Studies in language and philosophy*. Ithaca, NY: Cornell University Press.
- Bono, J. 1990. Science, discourse, and literature. The role/rule of metaphor in science. In *Literature and science: Theory & practice*, edited by S. Peterfreund, 59-89. Boston: Northeastern University Press.
- Bowker, G. 2000. Biodiversity datadiversity. *Social Studies of Science* 30 (5): 643-83.
- Bucchi, M. 1998. *Science and the media: Alternative routes in scientific communication*. London: Routledge.
- Cheng, V. 1995. 328 useful drugs are said to lie hidden in tropical forests. *The New York Times*, 27 June, p. C4.
- Chiappe, D. L. 1998. Similarity, relevance, and the comparison process. *Metaphor and Symbol* 13 (1): 17-30.
- Collins, C., and S. Kephart. 1995. Science as news: The emergence and framing of biodiversity. *Mass Communication Review* 22 (1-2): 21-45.
- Ehrlich, P. R. 1992. Environmental deterioration, biodiversity and the preservation of civilization. *Environmentalist* 12 (1): 9-14.
- Fernandez, J., ed. 1991. *Beyond metaphor: The theory of tropes in anthropology*. Stanford, CA: Stanford University Press.
- Evans, P. 1992. Environment post Rio: What is this thing called life? *The Guardian*, 21 August, p. 23.
- . 1993. Agenda: Survival has become a matter of economics. *The Guardian*, 21 May, p. 19.
- Gray, K. 1993. The ambivalence of property. In *Threats without enemies: Facing environmental insecurity*, edited by G. Prins, 150-70. London: Earthscan.
- Haila, Y. 1999. Biodiversity and the divide between culture and nature. *Biodiversity and Conservation* 8: 165-81.
- Hajer, M. 1995. *The politics of environmental discourse: Ecological modernization and the policy process*. Oxford, UK: Clarendon.
- Hannigan, J. 1995. *Environmental sociology: A social constructionist perspective*. London: Routledge.
- Hellsten, I. 2000. Dolly: Scientific breakthrough or Frankenstein's monster? Scientific and journalistic metaphors of cloning. *Metaphor and Symbol* 15 (4): 213-21.

- Hesse, M. 1970. The explanatory function of metaphor. In *Logic, methodology and philosophy in science*, edited by Y. Bar-Hillel, 249-59. Amsterdam, the Netherlands: North-Holland.
- Heywood, V. H., and R. T. Watson, eds. 1995. *Global biodiversity assessment*. Cambridge: Cambridge University Press.
- Jeffries, M. 1997. *Biodiversity and conservation*. London: Routledge.
- Kaennel, M. 1998. Biodiversity: A diversity in definition. In *Assessment of biodiversity for improved forest planning*, edited by P. Bachmann et al., 71-81. Joensuu, Finland: European Forest Institute.
- Kay, L. 1999. In the beginning was the word? The genetic code and the book of life. In *The science studies reader*, edited by M. Bagioli, 224-33. London: Routledge.
- Killingsworth, M. J., and J. S. Palmer. 1992. *Ecospeak: Rhetoric and environmental politics in America*. Carbondale: Southern Illinois University Press.
- Lakoff, G., and M. Johnson. 1980. *Metaphors we live by*. Chicago: Chicago University Press.
- Lewis, T. 2000. Media representations of "sustainable development." *Science Communication* 21:244-73.
- Livesey, S. 1999. McDonald's and the Environmental Defense Fund: A case study of a green alliance. *Journal of Business Communication* 36 (1): 5-39.
- Luoma, J. R. 1991. Taxonomy, lacking in prestige, may be nearing a renaissance. *The New York Times*, 10 December, p. C4.
- Maasen, S. 1994. Who is afraid of metaphors? In *Biology as society, society as biology: Metaphors*, edited by S. Maasen, E. Mendelsohn, and P. Weingart, 11-35. Dordrecht, the Netherlands: Kluwer.
- Maasen, S., and P. Weingart. 1995. Metaphors—Messengers of meaning: A contribution to an evolutionary sociology of science. *Science Communication* 17:9-31.
- . 2000. *Metaphors and the dynamics of knowledge*. London: Routledge.
- Macnaghten, P., and J. Urry. 1998. *Contested natures*. London: Sage Ltd.
- Mayr, E. 1982. *The growth of biological thought: Diversity, evolution, and inheritance*. Cambridge, MA: Belknap.
- Mazur, A., and J. Lee. 1993. Sounding the global alarm: Environmental issues in the US national news. *Social Studies of Science* 23:681-720.
- Muir, S. A. 1994. The web and the spaceship: Metaphors of the environment. *ETC: A Review of General Semantics* 51:145-53.
- Murray, M. 1993. The value of biodiversity. In *Threats without enemies: Facing environmental insecurity*, edited by G. Prins, 66-84. London: Earthscan.
- Myers, N. 1993. For dear life. *The Guardian*, 10 June, pp. 12-13.
- . 1995. Biodiversity: Bugs in the system. *The Guardian*, 19 October, p. 8.
- Myerson, G., and Y. Rydin. 1996. *The language of environment: A new rhetoric*. London: UCL Press.
- Papineau, D. 1992. In the footsteps of the dodo. Book review of E. O. Wilson's *The Diversity of Life*. *The New York Times*, 4 October, p. 7:1.
- Pearce, D., and D. Moran. 1994. *The economic value of biodiversity*. London: Earthscan.
- Radford, T. 1994. Till death us do part. *The Guardian*, 2 June, p. S6.
- . 1995. World losing three species every hour. *The Guardian*, 18 February, p. 8.
- . 1997. Alarm grows as mankind wipes out species in their thousands. *The Guardian*, 24 October, p. 1.
- Reid, W. V., A. Sittenfeld, S. A. Laird, D. H. Janzen, C. A. Meyer, M. A. Collin, R. Gamaz, and C. Juma. 1993. *Biodiversity prospecting: Using genetic resources for sustainable development*. Washington, DC: World Resources Institute.

- Schneider, K. 1992. U.S. to reject pact on protection of wildlife and global resources. *The New York Times*, 29 May, p. 1:1.
- Shiva, V. 1993. The greening of the global reach. In *Global ecology: A new arena of political conflict*, edited by W. Sachs, 149-56. London: Zed.
- Stevens, W. 1991. Species loss: Crisis or false alarm? *The New York Times*, 20 August, p. C1.
- Takacs, D. 1996. *The idea of biodiversity: Philosophies of paradise*. Baltimore, MD: Johns Hopkins University Press.
- Tuxill, J. 1998. *Losing strands in the web of life*. Worldwatch Paper 141. Washington, DC: Worldwatch Institute.
- UK Systematics Forum. 1998. *The web of life: A strategy for systematic biology in the United Kingdom*. London: UK Systematics Forum.
- Välvirronen, E. 1998. Biodiversity and the power of metaphor in environmental issues. *Science Studies* 11 (1): 19-34.
- von Weiszäcker, C. 1996. Biodiversity newspeak. In *The life industry: Biodiversity, people and profits*, edited by M. Baumann, J. Bell, F. Koechlin, and M. Pimbert, 53-68. London: Intermediate Technology.
- Weingart, P., A. Engels, and P. Pansegrau. 2000. Risks of communication: Discourses on climate change in science, politics, and the mass media. *Public Understanding of Science* 9:261-83.
- Weingart, P., and P. Pansegrau. 1999. Reputation in science and prominence in the media: The Goldhagen debate. *Public Understanding of Science* 8:1-16.
- Wilson, E. O., ed. 1988. *Biodiversity*. Washington, DC: National Academy Press.
- . 1992. *The diversity of life*. Cambridge, MA: Harvard University Press.
- World Commission on Environment and Development. 1987. *Our common future*. Oxford, UK: Oxford University Press.
- Yoon, C. K. 1995. Monumental inventory of insects in a Costa Rican forest is under way. *The New York Times*, 11 July, p. C4.

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