

**BIOSOCIAL RECIPROCITY IN ENVIRONMENTAL
COMMUNICATION: A STUDY OF GIANT PANDA
CONSERVATION COMMUNICATION IN CHINA**

A Thesis

by

LIUQING YANG

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

December 2005

Major Subject: Science and Technology Journalism

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ABSTRACT

Biosocial Reciprocity in Environmental Communication:
A Study of Giant Panda Conservation Communication in China.

(December 2005)

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Chair of Advisory Committee: Dr. Susanna H. Priest

This study proposes *biosocial reciprocity* framework in environmental communication, which suggests the interdependent relationships between mass media, people's attitudes, and the physical environment. *Biosocial reciprocity* is applied to analyze the mass media's possible roles in giant panda conservation in China. The mass media's image construction of giant pandas is assessed through a content analysis of *People's Daily* (1995 to 2004); the conservation awareness, activities, and environment changes are assessed by a review of the country's giant panda conservation history and policies. The result suggests active interrelations among the media, Chinese attitudes toward wildlife, and the loss of wild panda population and habitat. The study urges that to positively influence the natural world, much needs to be done to improve the Chinese media's effectiveness in fostering grassroots environmental value and awareness. *Biosocial reciprocity* provides a practical conceptual framework for this study to sort out media-related linkages between the social and physical world of giant panda conservation.

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CHAPTER I

INTRODUCTION

Contemporary environmental communication research has a strong focus on the production and consumption of mass media. Many examine the images produced and the effects of those images on environmental attitudes (e.g. Podeschi, 2001; McComas et al., 2001; Mazur, 1998; Wall, 1999; Shanahan & Butler, 2001; Besley & Shanahan, 2004; Lomborg, 2001; Domfeh, 1999; Ader, 1995; Yin, 1999). Others examine the underlying social and economic forces that choose the images and make the media agenda (e.g. Curtin & Rhodenbaugh, 2001; Griffin & Dunwoody, 1995; Burgess, 1990; Hansen, 1991).

However, few researchers address the relationship between mass media and the *environment*¹ itself. With an observation that the physical and biological environment is generally excluded from environmental communication research, Backes (1995) introduces into this endeavor the *biosocial system theory*. He suggests a *biosocial perspective* on the role of mass communication in the interactions between people and the environment. Backes (1995) further proposes five generalized biosocial propositions and uses them to explain the communication-related linkages between the social system and the environment in a case study of the Auetico-Superior wilderness in Ontario and northern Minnesota.

Building upon Backes' (1995) generalizations, Chapter II proposes *biosocial reciprocity* and examines its theoretical background. *Biosocial reciprocity* represents the reciprocal interactions between media, people's attitudes and the physical environment. It is a conceptual framework by which mass communication studies can examine the media's role in environmental conservation in different biosocial cultural contexts.

This thesis follows the style of *Journal of Communication*.

¹ Environment in this paper is defined as the complex of physical, chemical, and biological factors in which a living organism or community exists (*Earth Observatory Glossary of NASA*. 2005 April, accessed through <http://eobglossary.gsfc.nasa.gov/Library/glossary.php3?mode=all>).

Biosocial reciprocity is applied to analyze the relationships between mass media and giant panda conservation in China. Based on the framework, Chapter III raises two hypotheses about Chinese media construction of giant panda images; *People's Daily's* coverage of giant panda conservation from 1995 to 2004 is analyzed quantitatively to test the hypotheses. Chapter IV raises three hypotheses; it conducts a historical study to review the general awareness, conservation policies and operations, and the changes in the panda bear's population and physical conditions. The results solidly relate China's mass media communication with the changes and happenings of giant panda conservation. Ways are suggested to improve the role of mass media in influencing Chinese people's environmental values.

CHAPTER II

BIOSOCIAL RECIPROCITY IN ENVIRONMENTAL COMMUNICATION

BIOSOCIAL RECIPROCITY FRAMEWORK

Principle of Reciprocity and Biosocial Perspective

The *principle of reciprocity* states that the world is a reciprocally integrated ecosystem comprising life forms and their environment. Life functions, such as perception and behavior, involve an environment, while environmental properties involve animate life forms (Lombardo, 1987). Species, including human beings, are continuously adapting and re-adapting to their physical environment (Krader, 1970; Bonnicksen & Lee, 1982; Bonnicksen, 1991).

The *principle of reciprocity* develops the theory of *biosocial systems*, which describes the mutual adaptations between a human society and its environment:

The co-adaptation of social systems with their physical environments is predicated on the reciprocal operation of two processes: the first of these consists of innovations and successive adjustments in the structure, behavior, and resource use practices of organizations in response to changes in the material, energy, and information they receive from other organizations and their physical environments; the second consists of successive adjustments in the structure and function of ecological systems in response to the material energy, and information that is transferred to them through the resources use practices employed by organization (Bonnicksen & Lee, 1982).

Backes (1995) introduces communication-related linkages into the *biosocial systems*. He accepts Bonnicksen and Lee's (1982) two-subsystem theory, the ecosystem and the social system. The linkage between the two subsystems, Backes (1995) states, is

through human perceptions of and behavior toward the ecosystem; the two systems undergo a continuous process of mutual adjustment:

Individuals and groups in society intentionally or unintentionally affect their physical environments, which respond to these actions in some manner, and this response, when perceived by individuals and organizations, encourages them to continue or change their actions (Backes,1995).

Biosocial theory is a broad outline that takes in a wide range of studies. It is a general framework for accessing the reciprocal relationships between the social system and the ecosystem. Hence it can be applied to the study of mass communication and the environment. Mass communication is a major part of the social system. Likewise, conservation of one species can be a major part of the ecology of the environment.

Backes' (1995) Generalizations

In his historical case study of the Auetico-Superior wilderness in Ontario and northern Minnesota from 1920 to 1965, Backes (1995) examines mass communication's role in the relationship between social values and social changes on one hand, and current environmental conditions and environmental changes on the other. Based on this study, he makes five generalizations (G):

- G1. Mass media construct images of place and disseminate them to audiences.
- G2. The more dependent a person is on the mass media for information about a place, the more important the mass media will be in shaping the person's images of that place.
- G3. The images people have of a place will affect that place's biophysical environment.
- G4. The level of social conflict over use and management of a place varies according to the extent that the dominant media images of the place contradict each other.
- G5. Environmental communication campaigns may interact with each other in ways that produce unintended effects on the environment.

Backes (1995) uses these generalizations to suggest possible linkages between the image construction of the environment by mass media and the changes in the environment itself. These propositions lead to a broader insight about how to encourage mass communication's positive impact on environmental conservation.

However, missing from these generalizations is one of the two indispensable reciprocal linkages: the impact of the physical environment on the society and the mass media. The five generalizations begin with the construction and dissemination of images by the mass media, develop through the media's shaping of the person's image, and end in the effects on the biophysical environment. They show only the effects in the direction of mass communication-human perceptions/behavior-ecosystem, but miss the reciprocal reactions from the other direction. Therefore, Backes' (1995) generalizations do not form an integral framework to emphasize the reciprocal relationships between mass media and the physical environment.

Biosocial Reciprocal Framework

Built upon Backes' (1995) generalizations (G), this paper suggests a *biosocial reciprocal framework* which is composed of four interrelated propositions (P) to further address the reciprocal interactions between mass media, people's attitudes and the environment.

P1. Mass media construct images of the environment on issues that reflect people's existing attitudes, and the power and ideology of a society's dominant institutions.

P2. Mass media influence people's attitudes on environmental issues.

P3. The attitudes people have of an environmental issue will change the environment targeted by the issues.

P4. The changes of the physical environment will feed back to change people's attitudes on related environmental issues.

These propositions do not exhaust the possible communication-related linkages between society and the environment, but serve as a broad and integral framework to emphasize the *biosocial reciprocity* in environmental communication. Borrowed from

Lombardo's (1987) study, *reciprocity* is here defined as “distinguishable yet mutually supportive realities.” *Biosocial reciprocity* here addresses the intrinsic attribute of the mass media-environmental interaction, that is: the distinguishable yet mutually supportive relationships among mass media, people's attitudes and the environment.

As figure 1 represents, there are two layers of reciprocity in this framework: the inner or direct layer indicates the reciprocal interaction between people's attitude with the mass media and with the environment, respectively; the outer or indirect layer happens between the mass media and the environment through the linkage of people's attitude. In this framework, *people* bring the mass media and the biophysical environment into a reciprocally integrated biosocial system.

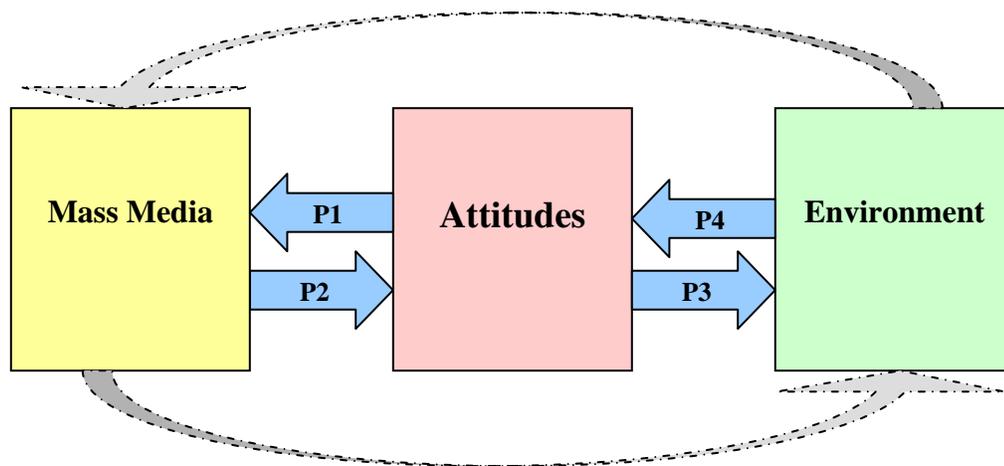


Figure 1: The Biosocial Reciprocity Framework in Environmental Communication

People's *attitudes*, which include their beliefs and values (Nickerson, 2003), are placed in the inner layer of this framework. An important assumption underlying the framework is that “attitudes are major determinants of behavior.” In other words, people behave in a way that is typically consistent with their attitudes (Nickerson, 2003). Environmental attitudes— here defined as “people's orientations toward

environmentally related objects, including environmental problems themselves and problem-solving actions” (Yin, 1999)— can be transformed into environmentally related behaviors by group and individuals. Thus changes of the attitudes in the psychological world can be transformed into human behavior in the material world, causing corresponding changes in the natural world through human behavior.

The first two propositions in this framework propose *reciprocity* between mass media and people’s attitudes. The third and the fourth propositions propose *reciprocity* between people’s attitudes and the environment. Consequently, a third *reciprocity* arises between mass media and the physical environment in the outer layer of the framework. People’s attitudes, as a major determinant of social behavior, provide a bridge for the exchange of information and energy between mass media and the environment.

The process of *biosocial reciprocity* in environmental communication is not linear dissemination. Instead, it is a multilaterally related, actively interacting, continuously processed biosocial system. Figure 2 models the *bidirectional ripple effect* of this dynamic system. Mass media, in the inner ripple circle, spread outward through various aspects of people’s attitudes and reach the biophysical environment. Meanwhile, in the other direction, the outer biophysical environment circle receives this energy and bounces back inward. It reaches the mass media through the buffering of people’s attitude and another round of ripple effect starts.

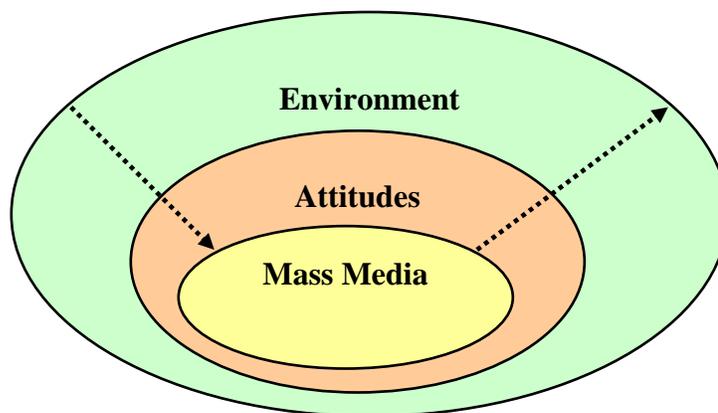


Figure 2: The Bidirectional Ripple Effect

It is worth mentioning that numerous other factors, such as politics, history, economy and biology, influence many aspects of this interaction. It is almost impossible for a study in one field to draw a complete picture of the interactions of the social and the physical world. A full understanding of the biosocial system requires scholars from various areas to examine the linkages from different aspects. The *biosocial reciprocity* proposed here attempts to provide only a general and simplified framework for assessing some of the mass media-related linkages between the social and physical world through the participation of people. This paper will later discuss the theoretical and empirical foundations on which the four interrelated *biosocial reciprocity* propositions are built.

A Case Study about Giant Panda Conservation in China

The *biosocial reciprocity framework* provides a helpful approach for communication scholars to sort out the mass media-related linkages from the many interactions between the society and the natural world. The framework calls attention to questions about the reciprocal correlation between mass media and the physical environment, for example: (1) What role do mass media play in environmental conservation? (2) Are mass media one of the players bringing changes to the natural world? (3) Do positive changes of the natural world, in turn, form new images in the media, bringing more environmental awareness? (4) Since different sources of information, including mass media, are vitally important for forming people's environmental knowledge and attitude, how do mass media determine conservation practice through changes in people's behavior and attitudes?

A case study for media's role in panda bear conservation in China will contribute useful perspectives to answer the above-raised broad questions. Instead of tangling broad environmental topics together, such as air and water pollution or population control and wildlife protection, environmental communication studies should focus attention on specific issues (Van Liere & Dunlap, 1980).

This case study will apply the *biosocial reciprocity framework* to analyze communication about panda conservation in China. The *biosocial reciprocity* theory

requires mass communication research to look at multiple elements in three dimensions: mass media, people's attitudes/behavior, and the biophysical environment.

According to the first proposition proposed by *biosocial reciprocity*, two hypotheses (H) will be made:

H1. The images of giant panda and giant panda conservation constructed by Chinese media reflect the Chinese attitudes toward wildlife, more utilitarian², dominionistic³ and symbolic⁴ than ecologicistic and scientific⁵.

H2. Mass media coverage of the giant panda in China reflects the influence of powerful sources such as government agencies and research institutions.

Chapter III will test these two hypotheses by a quantitative content analysis of newspaper coverage about panda bear conservation. Chapter IV will review Chinese giant panda conservation awareness and history. According to the last three propositions proposed by *biosocial reciprocity*, Chapter IV raises three hypotheses (H) and qualitatively analyzes them:

H3. As Chinese media content frames more (or possibly less) utilitarian, dominionistic and symbolic concerns for giant panda than ecologic concerns, general awareness and conservation activity in China seem to reflect this pattern.

H4. The change of the physical conditions of the giant panda reflects Chinese people's attitudes and behavior about panda conservation.

H5. The change of the current awareness and practice in giant panda conservation reflects the feedback from the changes of the panda bear's physical conditions.

The following section will clarify the theoretical basis of the four biosocial reciprocity propositions, which form the foundation for the five hypotheses of this study.

² According to Kellert's (1996) typology of basic nature values, value refers to the practical and material exploitation of nature.

³ According to Kellert's (1996) typology of basic nature values, dominionistic refers to the mastery, physical control and dominance of nature.

⁴ According to Kellert's (1996) typology of basic nature values, symbolic refers to the use of nature for language and thought.

⁵ According to Kellert's (1996) typology of basic nature values, ecologicistic and scientific refers to the systematic study of structure, function and relationship in nature.

PROPOSITION ONE

PI. Mass media construct images of the environment that reflect people's existing attitudes, and the power and ideology of a society's dominant institutions.

Directly or indirectly, by statement and omission, in pictures and words, in entertainment and news and advertisement, the mass media produce fields of definition and association, symbol and rhetoric, through which ideology becomes manifest and concrete (Gitlin, 1980).

The above statement describes the process by which the mass media construct and solidify social values. The phenomenon that mass media select and present some aspects of social reality, especially familiar culture symbols, is defined as framing (Entman, 1993; Tuchman, 1978). Media carry frames that are “persistent patterns of cognition, interpretation and presentation, of selection, emphasis and exclusion” (Gitlin, 1980).

Based on this recognition, proposition one (P1) goes further to ask the question of what or who influences the framing of media images, and how these forces influence the framing of mass media images. These two basic questions for understanding the media content, however, are sometimes missing from the highlights of some contemporary communication studies. To find answers for these questions, the concepts of *cultural resonance* and *information subsidies* are introduced.

Mass Media Images Are Resonances of Culture

Mass media are an active, integral part of a complex cultural process, through which environmental meanings are produced and consumed (Burgess, 1990).

Like Burgess (1990), scholars have long agreed that communication is not a linear, unilateral impact effect flow from media to the public, and simple causal stimulus and response can not adequately explain mass media (Hansen, 1991). This connotation sets the foundation for *cultural resonance* in mass media.

The *culture resonance* perspective emphasizes the role of the existing social culture in constructing media content. Mass media is not a in a fixed state. People's

attitudes and daily lives continuously fill in materials and sources (Hansen, 1991). Media text is a complex environment that comprises social elements including personality, family, neighborhood, work and ideology (Silverstone, 1985). Particular meanings are encoded in media texts to support an ideological position (Burgess, 1990). In this encoding process, journalists play a special part. As social members, journalists are inevitably influenced by social forces, thus help to construct reportages that reflect the spectrum of socially prevalent attitudes (Wolch et al., 2001; Lindahl, 1993). The *culture resonance* effect is found not only in media content production, but also in the consuming of media products. Holbert and colleagues (2003) find that environmental attitudes influence patterns of television use. Individuals' consumption of media content reflects their self-perceptions, views and goals.

Media Images Reflect the Ideology of the Dominant Social Institutions

The media do not possess power as independent actors and rather must reflect the power and ideology of a society's dominant institutions (Corbett, 1992).

As for environmental communication, the media "power" comes from elite and authoritative sources such as government officials, scientists and industry. Studies have found a dominance of authoritative sources for the coverage of environmental issues in many countries including Canada, Ghana, England and the United States (Domfeh, 1999; Hansen, 1991; Einsiedel, 1988; Mazur, 1998; Corbett, 1992). Recent content analyses of newspaper, magazines and television further confirm that environment communication is primarily controlled by "expert" and scientific sources (Corbett, 1992). Yin (1999) proposes an *elite opinion leadership* model in environmental attitudes: "the public holds certain attitudes because such attitudes are created by a handful of 'elites.'"

On one hand, the use of authority as the major source for environmental communication can be explained by the fact that journalists tend to turn to politicians and scientists for validation of environmental claims (Hansen, 1991). In a 1993 survey about sources of environmental coverage, 51% of journalists listed government officials, press releases, and reports as their first source of information (Curtin & Rhodenbaugh,

2001). On the other hand, it can be a result of the “information subsidies” voluntarily provided by influential social forces (Gandy, 1982).

Gandy (1982) points out that the public relations industry, as a component of publicity strategies of powerful government agencies and business interests, provides news releases, press kits, news conferences and other activities as “*information subsidies*” to news media. Those subsidies⁶ are powerful for setting the media agenda because they are easier, quicker and cheaper for journalists than independent newsgathering activities. Gandy observes that information specialists occupy every level of government in order to ensure the nation’s public media carry the desired message forward to the general public.

Information subsidies theory provides the “rule of least effort” to explain the newsgathering behavior of journalists (Griffin & Dunnwoody, 1995). Studies have revealed the influence of *information subsidies* in environmental communication (Curtin & Rhodenbaugh, 2001; Griffin & Dunwoody, 1995). Domfeh (1999) concludes:

Environmental news can be seen as an institutional product, often reflecting the interests of those who hold economic and political power; as a strategic arena where significant actors struggle over how environmental issues are to be defined; as an organizational product, shaped by news conventions and the economic interests of the media; and as an individual product, the result of the interests and beliefs each journalist brings to the news production process (Domfeh, 1999).

In other words, people’s beliefs and attitudes, as an essential component of social culture, influence both the production and consumption of media images in environmental communication. In the process of image construction, government agencies and “experts” dominate the sources for environmental coverage. Two elements may contribute to this source preference: journalists turn to authority for environmental information validation, and certain authorities intentionally provides *information subsidies* to spread their agenda and values.

⁶Subsidy literally refers to “a grant or gift of money,” especially “a grant by a government to a private person or company to assist an enterprise deemed advantageous to the public” (*Merriam-Webster Online Dictionary*, access: <http://www.m-w.com>).

Based on proposition one, two hypotheses (H) are made:

H1. The images of giant panda and giant panda conservation constructed by Chinese media reflect the Chinese attitudes toward wildlife, more utilitarian, dominionistic and symbolic than ecologicistic and scientific.

H2. Mass media coverage of the giant panda in China reflects the influence of powerful sources such as government agencies and research institutions.

The hypotheses will be tested through a content analysis of *People's Daily's* giant panda coverage.

PROPOSITION TWO

P2. Mass media influence people's attitudes on environmental issues

Not only reinforcing and activating the existing opinion, the media also create new opinion (Yin, 1999).

Mass media research suggests that media have substantial influence on public opinions. The most widely accepted theory about media influence is *agenda-setting* (Mazur, 1998). *Agenda-setting* theory discovers that mass media are successful in telling people "what to think about" (McCombs & Shaw, 1972). Communication scholars find significant *agenda-setting* effects on environmental issues (Curtin & Rhodenbaugh, 2001) Empirical studies agree on mass media's control over public attention on specific concerns such as health risk communication, pollution and global environmental change (Mazur, 1987; 1998; Ader, 1995). The public is observed to rely heavily on the media for environmental information (Curtin & Rhodenbaugh, 2001),

Not only do mass media tell people "what to think about," but also "what to think." Stamm & colleagues (2000) find that mass communication makes a positive contribution to global warming understanding while perpetuating some popular misconceptions. Holbert and colleagues (2003) suggests that fact-based television use has a significantly positive influence in creating a greater desire within individuals to be more energy efficient in their daily routines, and to recycle and purchase products that

are environment-friendly. Burgess (1990) finds that natural history films encourage greater sensitivity to wildlife conservation.

Personal experience filters and mediates the media's ability to influence public attitude about issues in the news (Atwater et al., 1985). To what extent the media influence the public depends on how much the public relies on the media to get information (Yin, 1999). Because individuals have little personal contact and experience with most environmental issues, there is a stronger agenda-setting influence in environmental communication (Ader, 1995; Hansen 1991).

According to Besley and Shanahan (2004), demonstrating media effects, as with any set of causal relationships, is one of the biggest challenges of communication research. The first two propositions proposed in this paper suggest the reciprocal process between media images and people's attitudes toward environmental issues. The propositions here do not indicate a rating of who influences whom in the first place. It is essential to the understanding of the *biosocial reciprocity* framework that the relationships between variables are continually adjusted by feedback.

P2 requires environmental communication studies to look at both social and attitudinal components. Together with the results of the newspaper analysis, the third hypothesis is made:

H3. As Chinese media content frames more (or possibly less) utilitarian, dominionistic and symbolic concern for giant panda than ecologic concerns, general awareness and conservation activity in China will to reflect this pattern.

It is beyond the range of this study to conduct empirical quantitative studies to collect particular attitudinal data. However, under the assumption that *attitudes* are major determinants of behavior (Nickerson, 2003), the attitudinal figure can be revealed through a historical review of the Chinese giant panda conservation practice and activities. The Chinese general attitude toward wildlife will also be examined.

PROPOSITION THREE

P3. The attitudes people have about an environmental issue will change the environment targeted by the issue

Just as the world around us affects our behavior, our thoughts, emotions, and actions affect our surroundings (Gallagher, 1993).

Environmental psychologists who study the relationship between human behavior and the natural environment observe that human behavior, in the aggregate, significantly impacts environmental changes (Nickerson, 2003). Environmental knowledge and attitudes are the essential elements to determine environmental behavior and policies (Arcury, 1990). Thus to a substantial degree, people's perception of the environment forms the causal roots for ongoing environmental changes and the changes that are projected in the future (Nickerson 2003).

Many empirical studies try to answer how the kind and amount of environmental information that reaches the public may serve as a basis for the public's actions toward the environment (Domfeh, 1999). Those studies detect positive effects on environmental behaviors by the use of certain mass media productions, including films and television programs (Stamm et al., 2000; Holbert et al., 2003; Burgess, 1990; Krendl et al., 1992). Burgess (1990) suggest that the media might contribute to long-term changes in human-environment relations. He notes that more research needs to be done to access the possible environmental changes that are caused by the mass media.

However, like other cause-and-effect relationships in environmental communication, it would be fallacious to single out people's attitudes or beliefs as the sole cause of a physical change in the environment. Many ingredients, ecological and social, interact in this process. Proposition 3 (P3) only tackles the links involving environmental attitudes/behavior with environmental changes. Since the attitudes that people have about issues can influence their interaction with the physical environment, researchers should study how to encourage mass media to play a positive role in fostering environmental-friendly attitudes.

According to P3, the fourth hypothesis is raised:

H4. The change of the physical conditions of the giant panda reflects Chinese people's attitudes and behavior about panda conservation.

This hypothesis will be qualitatively tested by examining the change of the physical conditions for giant pandas in Wolong, the largest panda bear reserve and research institute in the world.

PROPOSITION FOUR

P4. The changes of the environment will feed back to change people's attitudes on the related environmental issues

Humans are closely tied to the physical environment. Their concerns, their capacities, their hostilities and their ways of identifying themselves all reflect this bond (Kaplan & Kaplan, 1978).

The proposition about the impact of the physical environment on people's attitudes is based on one fundamental idea from behavior and environmental psychology studies: environment influences behavior. Modern science has confirmed that the environment, besides other genetic, social and historic factors, shapes people's thoughts, actions and feelings (Gallagher, 1993).

Environmental psychology has a focus on how the characteristics of the environment, including the built environment and the natural environment, affect human beings (Russell & Ward, 1982; Nickerson, 2003). In the long history of human evolution, even the danger and uncertainty of the environment is believed to profoundly contribute to the survival of human ancestors (Kaplan & Kaplan, 1978). The way people perceive and think, the way people take in and process information from the environment, are both consequences of this evolutionary history (Kaplan & Kaplan, 1978).

Perceptions do not exist without the reality of physical material. The objective reality of the natural environment impacts human cognition, assessment, attitudes and behavior (Garling & Evans, 1991). A study finds that people from inner cities score lower in their knowledge about natural environments than people more familiar with the natural world (Orians, 1986). In the interaction of human and environment, either

directly or indirectly, “the power of place” carves our thoughts, emotions and actions (Gallagher, 1993).

Although objective reality guides people’s actions, each individual perceives or experiences the world in individual and unique ways (Nickerson, 2003). Personal experiences such as “whether you were scared by a snake or not when you were a kid” can influence an individual’s perception of environmental issues (Orians, 1986).

In summary, changes of the physical environment impact people’s perceptions and attitudes to the environment. As an important component of social culture, those attitudes further impact how and what images would make their way to the mass media agenda. In turn, mass media images can possibly influence the physical environment by changing people’s attitudes and behavior. Thus this framework satisfies *biosocial reciprocity* between the physical environment and the mass media: mass media influence environment change, while environmental change is reflected in mass media content.

Therefore, the fifth hypothesis is made according to P4:

H5. The change of the current awareness and practice in giant panda conservation reflects the feedback from the changes of the giant panda’s physical conditions.

In order to test this hypothesis, this study will examine the new trend of Chinese giant panda conservation policies and practice, especially the new attitudes taken by Chinese government agencies and major scientific communities in the beginning of the 21st century.

CHAPTER III

THE GIANT PANDA IN CHINA'S MEDIA

PEOPLE'S DAILY CONTENT ANALYSIS

The Giant Panda in China

There are three reasons to choose the giant panda as a case study of environmental communication in China. First, the giant panda is a conservation icon in China. As a famous, highly endangered species, this creature arouses emotions, sympathy and curiosity in the general public (Martin, 2002). Chinese and international sources have put tremendous efforts into giant panda conservation. Second, previous studies provide abundant literature. Much is known about the biology, environment and socioeconomic status of the giant panda. Third, the giant panda is unique to China. China hosts all remaining panda habitat. Thus the Chinese society provides the primary source for giant panda communication, and people's attitudes toward this creature have profound Chinese cultural background. The Chinese perception of giant pandas reveals significant information about how Chinese people view wildlife in general.

The giant panda survives on a very delicate life balance in the dense bamboo forest in southwest China. It is a carnivore but it feeds almost exclusively on bamboo (99%). Its simple, carnivore's digestive track lacks microbes to break down hard cellulose into nutrients. Only about 17% of the bamboo a panda consumes can be digested. The giant panda spends half its time foraging on a large amount of bamboo. The giant panda intakes 4,300 to 5,500 kilocalories per day, while burning 4,000 kilocalories or more. Because of this narrow energy margin, giant panda survival is a battle of energy saving and access to stable bamboo supplies. It lives in solitude, avoiding social contact except when courting. Female giant pandas do not reach sexual maturity until age 5, and they are in heat for only two or three days in an annual mating season. They have a gestation period of about three months, give birth to single young

or sometimes twins every two years, and abandon one twin at parturition. The newborn weighs a quarter pound. It is 900 times smaller than the mother, smallest in size relative to the mother among all placental mammals. Before they turn two, giant pandas strike out on their own. A giant panda lives less than 15 years in the wild, and females bear about 4 cubs (Schaller, 1993; Lu & Schaller, 2002; Lindburg & Baragona, 2004; WWF, 2005).

The conservation of giant panda started from captive breeding in the 1950s. Until very recently, most artificial breeding facilities went through serious difficulties: captive giant pandas have low interest in mating, low pregnancy rate and high infant mortality. By 1985, from the 304 captive worldwide, only 76 cubs were born and 57 of them died in their first month (Lu & Schaller, 2002). Between 1963 and 1998, only 33% of the 73 litters (112 young) survived (Lu & Schaller, 2002). Some people were convinced that the giant panda's physiological features are the culprit of the captive breeding failure; they thought the giant panda had reached its evolutionary dead-end.

Others, however, supported by field observation data about wild giant panda behavior, argued that the animal was able to adapt to its vegetarian diet and transfer to new bamboo sources under food shortage (Schaller et al, 1985). The wild giant pandas were breeding well; the wild animal was far better off than its captive counterparts (Pan, 2002). Many argued that the best strategy for saving the giant panda was to provide larger protected habitats; poaching, logging, and the rapid fragmentation of habitat were the fundamental threat to extinction.

Despite the long-lasting debate in China's controversial giant panda conservation history, the Chinese in recent years have gained international recognition for the improvement of the situation. Over 40 nature reserves have been established, covering half the giant panda's habitat. Captive breeding has achieved increased pregnancy and infancy survival rates, bringing the total captive number up to 160 worldwide. An national panda survey in 1999-2002 found an estimated 1,600 surviving in the wild (Lindburg & Baragona, 2004; WWF, 2005). This evolving history of giant panda

conservation provides a precious resource for studying the interrelationships between Chinese media, public attitudes toward wildlife, and changes in the natural environment.

Content Analysis

Content analysis has been used to describe media trends, identify the intentions of the communicators, reveal the focus of attention, and reflect attitudes, interests and values of the society (Krippendorff, 1980). Newspaper in particular is a measurable medium with strong agenda-setting effects (Atwater, 1985; Arder, 1995). Newspaper articles reflect experiences and concerns, and reveal the focus of attention and the attitudes, interests and values of population groups over time (Krippendorff, 1980; Wolch et al. 2001).

This study applies content analysis to examine the image and sources of the newspaper coverage about giant panda conservation in China. The Chinese giant panda communication is a typical case: the Chinese attitude toward wildlife is widely believed to contain strong worldly, utilitarian, dominionistic and symbolic elements (Jenkins, 2002; Harris, 2004; Harris, 1991; 1996; Sterckx, 2002); meanwhile, Chinese wildlife conservation is nearly unilaterally carried out by government-related organizations; the first non-government environmental group, Friends of Nature, did not debut until 1994 (Lu & Schaller, 2002; Harris, 2004). Therefore according to biosocial reciprocity framework, two hypotheses are made:

H1. The images of giant panda and giant panda conservation constructed by Chinese media reflect the Chinese attitudes toward wildlife, more utilitarian, dominionistic and symbolic than ecologically aware.

H2. Mass media coverage of the giant panda in China reflects the influence of powerful institutions such as government agencies and research institute.

METHODS

In order to access these hypotheses, this study quantitatively analyzed the news coverage of *The People's Daily* from January 1995 to December 2004—a full decade.

The topics, sources, themes, overall tones and story types of each giant panda story were coded into inclusive and mutually exclusive categories. A “grounded theory” approach was used in developing the categories, allowing the themes and topics to emerge from the data (Glaser & Strauss, 1967). Although it is impossible for this study to check all the various mass media forms, *People’s Daily* is China’s largest and most influential newspaper (Zhao, 1998; Jin 2002) and reveals patterns that are useful for understanding Chinese mass media more generally.

Population and Sample

The population of this study is the *People’s Daily* online database as available at <http://www.people.com.cn/GB/43063/43079/43084/index.html> (2000-2004) and at <http://search.peopledaily.com.cn/was40/people/qtbzsearch.htm> (1995-1999). Material for study was selected through keyword searches within these databases: “大熊猫 (giant panda).” Among the 341 articles that had the keyword “大熊猫 (giant panda),” including news sections, feature stories, photograph report, editorials, opinion columns and letters to the editor, 147 had giant panda and its conservation as the main topic. These 147 articles were analyzed as study samples.

Coding Categories

1. Publication date

2. Direct sources and indirect sources

The directly quoted or otherwise clearly identified sources were coded as direct sources. The affiliations of the article’s main subject matter were coded as indirect sources. The indirect source category was based on the assumption that when an article does not identify the collective or individual sources, the sources of that article are most likely to be whomever it reports about. For example, if an article had Hua Mei, a panda

bear cared for by Wolong Research Center as the major subject matter, the Wolong Research Center was coded as the indirect source.

3. Topics

A topic is a summary label of the domain of social experiences covered by a story (Pan & Kosicki, 1993). As the focus of a story, the topic in this study was identified as the most heavily emphasized substantive topic discussed in an article. Although many topics might be discussed, the one that were most central to the articles was identified.

4. Themes

A theme in this study was defined as an idea that connects different semantic elements of a story (e.g., descriptions of an action or an actor, quotes of sources, and background information) into a coherent whole (Pan & Kosicki, 1993). Themes are different from topics. Themes, as ideas, are intrinsically related to meaning (Pan & Kosicki, 1993). One article can have many themes that focus on one major topic. If a specific theme was mentioned more than one time in an article, that theme was coded only once.

5. Overall tone

The overall or predominant tone was defined as the side that the article took about its topic: positive, negative or neutral. To determine the overall tone, this study borrowed Wolch and colleagues' (2001) method and examined a combination of three indicators: attitudes presented, terminology used, and information bias (use data to highlight a certain side of the story). Although many opinions might be presented in an article, the "overriding tones typically outweigh conflicting undertones, and leave more lasting impressions" (Wolch et al., 2001).

6. Story type

This study coded the sample stories into two types: reports that provided scientific background information, and reports that did not provide scientific background information. Reports with scientific background information referred to those that explained the physical attributes or conservation biology of giant pandas in a careful manner. Reports without scientific background information referred to those in which no scientific explanatory narrative was found (Those articles might include a brief statement of facts, e.g. “There are three major difficulties in giant panda reproduction: mating, pregnancy and survival of the cubs”).

Reliability

The coding was done by the author. A 40% sub-sample was recoded to determine the reliability. The recoding reveals a reliability of 95%.

RESULTS

Table 1. Publication Date of the Reports in *People’s Daily*

Publication Date	Number of Articles
1995	6
1996	9
1997	7
1998	7
1999	12
2000	13
2001	13
2002	8
2003	34
2004	38
Total	147

Table 2. Direct Sources and Indirect Sources of the Reports in *People's Daily*

Source	Direct: Frequency/percentage	Indirect: Frequency/percentage
1 Wolong Research Center (Include Wolong Natural Reserve)	9/6.1	23/15.6
2 Chengdu Breeding Base	2/1.4	11/7.5
3.Foping Nature Reserve and the Qinling Wild Research Center for Giant Pandas	1/.7	6/4.1
4 Other Chinese nature reserves, zoos and research centers	6/4.1	38/25.9
5 Chinese government administration agencies	20/13.6	17/11.6
8 International sources	18/12.2	43/29.3
7 Chinese interest groups, private individuals and business	4/2.8	8/5.4
9 Other sources	1/.7	9/6.1
10 Sources unknown	97/66	0

Table 3. Topics of the Reports in *People's Daily*

Topics	Articles /percentage of articles
Captive giant panda conservation and research	83/56.5
Wild giant panda conservation and research	43/29.3
Conservation-related public activities	17/11.6
Other topics	4/2.7
Total	147/100.0

Table 4. Themes and Topics of the Reports in *People's Daily*

Themes	Articles that have theme	Captive giant panda conservation and research	Wild giant panda conservation and research
1 Being taken good care of in captivity	64/43.5	62/74.7	2/4.7
2 Superstar abroad	33/22.4	31/37.3	0
3 National symbol	26/17.7	18/21.7	3/7.0
4 Generous donations and active public engagement help panda conservation	25/17.0	9/10.8	1/2.3
5 Research/researchers help conservation	17/11.6	16/19.3	1/2.3
6 Difficult captive breeding and physical attributes to be blamed	15/10.2	11/13.2	3/7.0
7 Habitats damaged	12/8.2	3/3.6	8/18.6
8 Sound policies and management take good care of habitats	11/7.5	4/4.8	7/16.3
9 Residents take good care of wild giant pandas/habitats	7/4.8	1/1.2	6/14.0
10 Giant pandas love people	5/3.4	2/2.4	3/7.0
11 Poaching punished	4/2.7	0	4/9.3
12 Other Themes	22/15.0	12/14.5	5/11.6

Table 5. Overall Tone of the Reports in *People's Daily*

Over all Tones	Articles /percentage of articles
Positive	95/64.6
Negative	4/2.7
Neutral	48/32.7
Total	147/100.0

Table 6. Story Type of the Reports in *People's Daily*

Story Type	Articles /percentage of articles
Reports with Scientific explanation	22/15.0
Reports without Scientific explanation	125/85.0
Total	147/100.0

DISCUSSION

Dominionistic/Symbolic Values in the Reports

The content analysis of the topics, themes, overall tones and story types all supported H1: the images of giant panda and giant panda conservation constructed by *People's Daily* in the past 10 years reflected a more utilitarian, dominionistic and symbolic viewpoint that lacks ecological awareness.

With regard to story topics (Table 3), more attention was given to captive breeding: 83 articles (56%) were about captive giant pandas and related topics; 42 (29%) were about wild giant pandas and related topics; and 17 (11.6%) were about public conservation activities.

With regard to story themes (Table 4), articles that had dominionistic or symbolic value related themes took the majority: 64 (43.5%) articles had a “being taken good care of in captivity” theme (dominionistic); 33 (22.4%) had “superstar abroad” theme (symbolic); 26 (17.7%) had a “national symbol” theme (symbolic); 25 (17%) had “generous donation and active public engagement help giant panda conservation” (dominionistic and ecological); and 17 (11.6%) had “research and researchers help conservation” theme(dominionistic and ecological). Only 12 (8.2%) articles had a “habitats damaged” theme (ecologically aware).

The value revealed in the content is more evident if breaking down the themes according to stories with different topics. Among the 83 articles about captive breeding, the overwhelming themes were “being taken good care of in captivity (dominionistic)” (62 articles); “super star abroad (symbolic)” (31 articles); “national symbol (symbolic)” (18 articles); and “researchers and research are helpful” (dominionistic and ecological) (16 articles). Moreover, in describing those themes, a noticeable amount of sentimental or personifying expressions were used: “Ling Ling (the panda)’s heart was filled with excitement. He was looking forward to the Mexico trip to meet his bride (陵陵好像按耐不住心头喜悦...前往墨西哥相亲); “The staff tend the panda bear with love and great carefulness, as if the pandas were their own children (精心护理, 悉心照料, 像自己的孩子); the giant panda’s enclosure was described as a “country mansion(乡间别墅),” “garden of Eden (生活乐园); the Chengdu Breeding Center was “the place where miracles are made (创造奇迹的地方); the enclosed giant pandas were “pressure-free (悠然自得),” “leisurely” and “careless(悠闲生活),” and “indulged in pleasure and forgot their home (乐不思蜀); The giant panda was “national treasure (国宝),” “rare treasure (稀世珍宝),” “super star (明星),” an “ambassador for peace (和平大使)” and a “friendship angel (友谊天使).” Such terminology and expressions heavily emphasized the success of artificial breeding, the worry-free life for the giant panda under human care, and the symbolic and political value of the giant panda.

Only 43 of the 147 articles were about the giant panda in the wild, and the themes of these “wild stories” were not virtually “wild.” Although continuing habitat destruction caused by human activity is identified to be the most serious threat to the giant panda (MOF & WWF, 1989; Lindburg & Baragona, 2004), only 8 articles had noticed “habitat damage.” A majority of themes optimistically portrayed a problem-under-human-control picture: “residents, sound policies and management take good care of habitat” (13 articles), “poaching punished” (4 articles), “[wild giant pandas] love people” (3 articles), “super star abroad” (3 articles). Missing from those stories, clearly, were themes about the challenges still confronting the wild giant panda population and the respect of the animal as a wild creature.

The overall tone of the articles agreed with the themes (Table 5); a majority of the articles (64%) had strong positive tones about giant panda conservation. Only 4 (3%) articles expressed negativity about the current conservation practice or the future of giant pandas. Clearly, a general undertone message was carried by the stories: under human efforts, the situation of giant pandas, in captivity and in the wild, was worry-free and better-off.

As for the story type, 125 (85%) reports did not provide thorough scientific information about giant panda conservation, and 22 (15%) explained the biology or ecology in the protection of giant pandas. This result further verified the hypothesis that the newspaper coverage neglected the ecological value of the giant panda.

To sum up, *People’s Daily* framed more concern about the human “success” in protecting the giant panda, the symbolic use of the animal and its “happy” life in captivity. On the contrary, little or no report space was given to habitat degradation, the protection and well-being of the wild population and the science and ecology of conservation. Rather than as a wild animal roaming in the forest, the giant panda is portrayed as a lovable, fragile, precious and politically symbolic animal tended under careful human care. In accordance with hypothesis one, the image constructed by *People’s Daily* unveiled strong doministic and symbolic values while showing weak ecological awareness.

Notably, the utilitarian value in the giant panda case was not identified as the use of animal parts as physical materials for people's daily life. As people hardly have any "use" for the giant panda—giant pandas have no great value for Chinese medicines (Schaller et al, 1985), the pelt is coarse and oily (Catton, 1990) and it is absent from restaurant menus—the "utility" is more symbolic than material. By an emphasis on the goodwill trips, the cuteness, rareness and the power of attracting public adoration, *People's Daily* pictured a "use" of giant panda as symbolic or spiritual products that served human needs.

Government as the Dominant Source

The analysis of the sources supported H2 (Table 2): the sources of *People's Daily* were dominated by Chinese government agencies and important institutions. Because 97 (66%) articles in the study did not identify their sources, the study further coded the affiliations of the articles' main subjects as indirect sources. It assumed that the "Who" an article reports about is probably among the sources that provide the information.

Both the direct and indirect sources showed that government-related sources are most frequently used by the newspaper reports. Among the 50 articles that had direct sources, 20 (40%) articles quoted from Chinese government administrative agencies; 18 (36%) articles quoted research centers and reserves owned by the government; and 18 (36%) articles used sources from other countries. Four articles (8%) quoted Chinese interest groups, private individuals or business. The distribution of indirect sources demonstrated a similar pattern. 78 (53.1%) were about state-owned research centers and reserves; 43 (29.3%) were about foreign zoos and governments; and 17 (11.6%) were about Chinese government administrative agencies. Eight (5.4%) were independent or private sources.

In addition, certain institutions were important source providers. Among the 18 articles that directly cited research institutions, 9 (50%) were from China Conservation and Research Center for Giant Panda at Wolong (Wolong Research Center), and 2

(11%) were from Chengdu Research Base of Giant Panda Breeding (Chengdu Breeding Base). About 50 other institutes, reserves and zoos share the remaining 7 articles. Among the 78 articles that had indirect sources from research centers and reserves, 23 (30%) were from Wolong Research Center, and 11 (14%) were from Chengdu Breeding Base. Wolong Research Center and Chengdu Base are the two major giant panda research and conservation facilities in China. They have the largest number of researchers and care for the most captive giant pandas. On the other side, voices from smaller giant panda research communities, including the Beijing University Giant Panda Conservation Center and the Wild Panda Research Center of Foping Nature Reserve, were seldom heard by the audience of *People's Daily*.

There is an overall lack of sources from scientists and research institutes. 18 (12%) of the 147 articles cited scientists and personnel from giant panda research communities. The overall lack of scientist sources may partly explain why 125 (85%) articles in this study did not provide thorough scientific information about giant panda conservation, and might be another contributor for the lack of ecological background information.

To sum up, the analysis of *People's Daily* revealed that Chinese government-related facilities were the dominant sources for the giant panda coverage. Although Chinese giant panda research institutes in general were not active direct source providers, certain powerful institutions still greatly influenced the media report. According to biosocial reciprocity theory, this preference of sources use might have two origins: the information subsidies provided by the dominant institutes and the journalists' personal selection influenced by the existing attitude and culture. International sources were the second most common source. This may be explained by the frequently reported "national symbol" and "superstar abroad" themes.

The *People's Daily* analysis supported the first biosocial reciprocity proposition: the newspaper constructed images that reflected the Chinese public's existing attitude towards wildlife, and the power and ideology of China's dominant institutions. In order to further unfold the biosocial reciprocal relationships between the media images,

people's attitudes and the physical environment of giant panda in China, the next chapters will examine the country's giant panda conservation history and current happenings.

CHAPTER IV

GIANT PANDA CONSERVATION IN CHINA

Chapter II displayed the images of giant pandas conservation constructed by *People's Daily*, as well as how this influential newspaper selectively used the authorities as its major sources. According to biosocial reciprocity framework, the media images can interact and co-evolve with the physical environment: mass media influence people's attitudes on environmental issues (P2); the attitudes people have of an environmental issue will change the environment targeted by the issues (P3); and the changes of the biophysical environment will feed back to change people's attitudes on the related environmental issues (P3). Guided by these propositions, Chapter III raises three hypotheses to tackle the relationships between Chinese media and giant panda conservation. The hypotheses are accessed by a qualitative historical review of giant panda conservation in contemporary China, including the general awareness and conservation operations, the changes of the physical conditions and the recent conservational moves. The results of the historical analysis agrees with all the three hypotheses.

GENERAL AWARENESS AND CONSERVATION OPERATIONS

Hypotheses

H3. Since Chinese media content frames more concern for symbolic/dominionistic values and captive breeding of giant pandas than the ecology, habitat protection and well-being of wild-living giant pandas, general awareness and conservation activity in China reflects this pattern.

In order to obtain an overview of the awareness and conservation practice in China, the study reviews the human-giant panda relationship in its long history and the major conservation policies and events after China launched its giant panda protection in

the 1950s. It examines the rescue, capture, and exportation of giant pandas, the captive breeding programs, and field research about wild giant pandas and their habitat. In addition to the nationwide sketch, the study looks closely at Wolong Nature Reserve (including the Wolong Research Center, which is within the reserve and is responsible for giant panda conservation in this region). As a global biodiversity hotspot and a “flagship” giant panda conservation site, much support has been given to Wolong and much has been studied there. Concerning its scale and the influence it casts at the special geographic location, Wolong natural reserve is considered a microcosm of how Chinese confront the problems of giant panda conservation (Schaller, 1993; An et al., 2005).

Historical Review

In contemporary China, the communist regime name the giant panda “a national treasure” after the 1949 declaration of independence. Giant panda hunting was completely banned in 1962, and the first three natural reserves were established in Sichuan Province in 1963 (Lu & Schaller, 2002). Until 2004, 40 natural reserves have protected half of the range encompassed by giant pandas (WWF, 2005). The Chinese government has taken serious measures to protect the fragile animal. However, the Chinese effort was born with disagreement and heated debates. The Western World, as well as some domestic experts, charged that excessive attention has been paid to captive breeding at the expense of habitat protection (Harris, 1996). And by renting or giving the giant panda as gifts to foreign countries, the Chinese made substantial profits and political goodwill at the price of sacrificing the animal’s welfare (Begley, 1993).

1. General Awareness: The Precious National Treasure

Although empirical data about Chinese attitude towards the giant panda is not available, several studies have examined the general Chinese awareness of wildlife. This attitude is widely believed to contain strong worldly, utilitarian, dominionistic and symbolic elements (Jenkins, 2002; Harris, 2004; Harris, 1991, 1996). Most Chinese traditionally view wildlife primarily in terms of usefulness to human life and livelihood,

and secondarily as objects of beauty under the control of man or as moral symbols, without careful scientific and ecological considerations about the animals themselves (Harris, 1996; Sterckx, 2002). Certain species have been regarded as nuisances, even evil or dark forces, because they threaten crops, livestock and people (Catton, 1990). Traditional Chinese anthropocentric values, in combination with the new attractions of a Western exploitative lifestyle, is believed to result in an extremely pragmatic view of animals and natural resources that could seriously degrade the environment in China (Harris, 2004; Jenkins, 2002).

Despite the Chinese attitude about wild forms, the giant panda has aroused a level of public concern in China that is rarely enjoyed by other wildlife (Lu et al., 2000). The animal has remained the major star of conservation campaigns and media reports, and the Chinese government has put tremendous effort and sums of money into the establishment of giant panda nature reserves and breeding centers. Nevertheless, all this attention is regarded as “special treatment” for the giant panda; the concerns are not from a culture that is sympathetic to wildlife, but because the giant panda is fortunately “rare,” “endemic to China,” “world famous” and has minor value for daily-life use (Catton, 1990; Schaller et al. 1985).

On one hand, the giant panda was not heavily used in history, despite the Chinese tradition of killing wild animals for Chinese medicine, furs and exotic wildlife banquets. The giant panda is not recorded to have a great value for traditional medicines. Only the urine and the pelt are said to be useful: the urine to dissolve a swallowed needle, and the pelt to control menses (Schaller, 1993; Schaller et al, 1985). Both uses were not likely to create high demand. The hide is not a popular acquisition for the luxury fur market because it is coarse and slightly oily (Catton, 1990). And unlike pangolins, snakes, owls and monkeys, the giant panda does not appear on the menus of wildlife banquets as a delicious dish.

On the other hand, for over 2,000 years, the giant panda’s symbolic value and rarity has been prized in geography books and literature. The giant panda was considered a symbol of preciousness, wealth, might and bravery; they were much hunted for

imperial or luxury use as gifts or tribute on great occasions (Catton, 1990). In about 170 B.C., a panda skull was entombed with Dowager Empress Bo, mother of the western Han Dynasty (206 B.C.-A.D. 24) emperor. The western Han emperor kept 40 rare animals in his garden, and among those, the giant panda was most treasured. In Tang Dynasty (A.D. 618-907), two live pandas and some pelts were sent to Japan as an imperial gift of friendship for resuming trade relations between the two countries. The Tang emperors also used giant panda skins to reward honored officials (Schaller, 1993; Schaller et al., 1985; Catton, 1990).

In World War II, the Chinese nationalist government sent giant pandas abroad to solicit international support and sympathy for the war. After the 1949 liberation, the communist government named giant pandas a “national treasure” and started a new era of protecting and “using” giant pandas.

2. Giant Panda Diplomacy and Rent-a-Panda

For many years, the Chinese government has shipped live pandas to foreign countries. The early Chinese panda exportation was categorized into two periods: the political use period (1950s-1980s) and the commercial use period (1980s-1990s) (Schaller, 1993).

The exportation of giant pandas was triggered by the intense interest in this exotic animal from the Western World. In the 19th century, panda pelts became a precious trophy for western expeditioners, hunters and museum collectors (Catton, 1990). In 1936, the first live giant panda arrived in the United States and elicited immediate public interest, which resulted in a rush to capture live giant pandas for exhibition (Schaller et al. 1985). At least 73 giant pandas left China by the time of the 1949 liberation (Morris and Morris, 1966). By then, the western exploitation ended with the giant panda’s new appointment — goodwill ambassador for the new communist regime. The giant panda had been set under the limelight of important diplomatic occasions as a symbol of friendship. In 1957, one was given to Russia. In 1972, two juveniles were sent to U.S. President Richard Nixon to celebrate the establishment of U.S.-Chinese

communist government relationship (Schaller, 1993). Gifts to England, France, Germany, Japan, Mexico and Spain soon followed. By 1983, a total of 24 giant pandas were sent to 9 countries (Lindburg & Baragona, 2004).

The political use of giant pandas was slowed by a bamboo shortage crisis in the mid 1980s. One of the giant panda's major food sources, the arrow bamboo plant, mass-flowered and died in Sichuan. Giant pandas were reported to be starving and were rescued to captive facilities. Giant panda gifting was replaced by short-term loans to foreign countries for money. In 1984, a short-term loan of two giant pandas to the Los Angeles Zoo made a tidy profit for the Chinese government, which then expanded the commercial use of giant pandas (Schaller, 1993). Foreign zoos, particularly in North America, started the rent-a-panda campaign. The zoos made money and publicity, and the Chinese earned fees and overseas trips. In 1988, a six-month loan of two giant pandas to the San Diego Zoo generated a \$5 million income for the zoo (Schaller, 1993). By the end of the 1980s, giant pandas had been lent to Canada, Island, Japan, Australia and the Netherlands. And they were even about to be sent to Disney World and the Michigan State Fair (Catton, 1990).

Behind the triumph and big money of giant panda exportation, however, were gloomy reproduction tragedies. The Chinese government was criticized for using the giant panda at the cost of its conservation and welfare. At that time, captive breeding in China was going through great difficulties. Captive reproduction was far from sustainable, let alone disrupting the giant pandas' reproductive cycles by sending them on long, stressful overseas trips (Schaller, 1993). Isolated in a foreign zoo, many animals lost mating opportunities for not being able to find a suitable partner. Very few giant pandas reproduced in foreign zoos. Under pressures from the academic world and international conservation organizations, the capitalization on panda for commercial gain was eventually banned by the World Wildlife Fund and the American Zoo and Aquarium Association (AZA) (Lindburg & Baragona, 2004). Animals are still sent to foreign countries, but under the new international loan policy, the sole justification for an export

has to be the promotion of research that will benefit wild giant pandas (Lindburg & Baragona, 2004).

3. Breeding a Giant Panda in Captivity

The captive breeding of giant pandas in China has a controversial history. It is characterized by years of ineffective reproduction efforts and disputes over the biological and ethical treatment of the giant panda. A review of the literature in the past two decades exposes rather fervent critics from the “save-the-wild-panda” side, mostly conservation biologists who lobby for more field research. China is blamed for keeping more captive animals than necessary, while giving inadequate support to field research and failing to protect suitable habitat.

In the past few decades, zoos and breeding centers had a series of difficulties in giant panda reproduction: low reproduction rate, males’ low interest in mating, failure in artificial insemination and high infant mortality. Until recently, the number and survival rate of captive-born young was surprisingly low. The captive breeding of giant pandas started as early as the 1950s, but the first successful birth by natural mating came only in 1963. The first successful artificial insemination occurred in 1978. By 1985, only 76 out of the 304 giant pandas kept in captivity worldwide had been born in captivity. Of these, 57 had died in their first month (Lu & Schaller, 2002); Between 1963 and 1989, 119 cubs were born in captivity, only 31% survived more than 6 months. Between 1990 and 1996, 62 cubs were born, only 71% survived more than 6 months (Lu & Schaller, 2002; Schaller et al., 1985; Ellis et al., 2004). The infant survival rate has risen in recent years due to improved technology and more experience with artificial breeding, but natural breeding is still seen as the biggest problem for the captive population. Between 1936 and 1999, 431 of the 497 captive pandas did not breed; some of them died young, and others showed no interest in the opposite sex (Lu & Schaller, 2002).

The difficulty of breeding giant pandas in captivity has raised worries about their survival. These worries have attracted huge media and public attention. Some attribute the reproductive difficulties to the giant panda’s evolutionary physiological features. But

many argue that the captive breeding disaster is due to human failure: flawed behavior knowledge, the ignorance of wildlife and a culture of animal domestication (Zhu et al, 2001). In 1992, based on over a decade of field observation in Qinling Mountains, a research team concluded that wild giant pandas were breeding well (Pan, 2002). All the radio-collared females in the study had produced and reared cubs, and all the males were active in breeding. Between 1989 and 1998, the team documented 13 births in Qinling Mountains. Only two yearlings died (Lu & Schaller, 2002). These researchers suggested that the captive breeding failures are generated by the lack of sufficient knowledge of giant panda biology and ecology in the nature. For example, it is a common behavior for a giant panda mother to leave her infant alone for a few days. But it is estimated that at least 30 cubs were believed to be abandoned and rescued from the wild, and more than half of them died soon after their removal (Lu et al., 1994). Also, it is crucial for male and female giant pandas to spend days or even weeks of courtship time together, making scent marks and competing for partners before mating. It is believed the captive facilities can not provide such conditions, which helps to make most captive giant pandas poor breeders (Catton, 1990).

Scientists conclude:

There was general agreement that the (captive) population was behaviorally and physically compromised and had little prospect of improvement in either quality of life or in numbers under traditional management regimes (Lindburg & Baragona, 2004).

4. The Campaign of “Rescue-the-Panda”

The “rescue-the-panda” campaign started in the late 1970s, when mass-flowering and die-offs of bamboo forests occurred in some giant panda ranges, and concerns arose that giant pandas were in danger of starving. In 1983, when arrow bamboo mass-flowered in Wolong, the government set up 13 emergency rescue centers and send people to the field to catch any giant panda that seemed to be starving (Pan, 2002). Until 1987, 108 giant pandas were brought into captivity. Some died or were released soon

after capture; a large number were sold to zoos or sent to captivity facilities. There were about 90 captured giant pandas in China and they were not included in a breeding program (Schaller, 1993). As an effort to breed the big captive population, the government established a captive breeding facility in Chengdu that was even bigger than Wolong. In the 1990s, when the bamboo die-off halted, giant pandas were still being removed from the wild. In 1991, 11 giant pandas were captured (Schaller, 1993).

The national rescue campaign, as well as the constant giant panda captures for zoos and breeding facilities, was criticized for lacking scientific justifications and for harming the wild giant panda population. In most giant panda habitat, less than 50 giant pandas survive. It is an alarmingly low number for the long-term survival and genetic diversity of giant pandas (Loucks et al., 2001). To remove giant pandas from their habitat further reduces the reproduction ability of the wild population (Li et al., 2003). Moreover, with more deaths than reproductions, the captive population is not self-sustaining: breeding facilities, local parks and zoos are maintained only by capturing wild giant pandas (Li et al., 2003). Many rescues following the bamboo die-offs were not necessary. Some scientists argue that giant pandas have the ability to migrate toward new bamboo supplies, or even adapt to alternative bamboo species in food shortage (Pan, 2002). According to estimates, although a total of 240 giant pandas were captured from the wild between the mid 1950s and the mid 1990s (Hu, 1998), only 113 giant pandas lived in captive facilities in the mid 1990s (Zheng and Zhao, 1994). In 2003, the captive animals made up an estimated 20% of the total giant panda population, an unhealthily high percentage that is rarely seen in other mammal species in China (Li et al., 2003).

On one hand, China was blamed for capturing and keeping “far too many” giant pandas in breeding facilities (Schaller, 1993). On the other, the government action did not focus on the largest threats to wild giant pandas— habitat destruction, fragmentation and poaching (Hu, 1998). Critics said China was headed in a direction that would cause giant pandas to exist only in captivity as performing pets (Catton, 1990).

5. The Dearth of In-depth Field Research

Compared to captive studies, giant panda field research did not attract much attention (Mainka & Lu, 1999). With the establishment of three giant panda nature reserves, the Chinese government began to take steps toward wild giant panda protection in the early 1960s (Dinerstein et al., 2004). However, scientific data about wild giant panda population was not available until the first population survey in 1977 (Lu & Schaller, 2002). In 1978, the first research team was sent to the field to study the effects of the mass bamboo die-off (Pan, 2002). In the 1980s, China had the first international cooperative program on wild giant panda research (Lindburg & Baragona, 2004). As a result, a book *Giant Panda in Wolong* was published in 1985, the first published book on giant pandas in the wild. In 1985, Pan Wenshi, a known giant panda specialist entered the Qinling mountains with his research team. They spent more than a decade in the field studying radio-collared giant pandas in the Qinling Mountains and contributed detailed behavior data to the giant panda study (Pan, et al. 2001).

Since the Chinese government's ban on using radio telemetry to study giant pandas in 1997, there have been no similar in-depth field giant panda research programs in China (Schaller, 2004). Radio telemetry is frequently used as an effective way to study wild bear populations. It is believed that the Chinese ban on radio collars severely hampered basic giant panda research (Lindburg and Baragona, 2004).

The dearth of knowledge about giant panda's habitat and its normal behavior pattern is recognized as a major obstacle for China's giant panda conservation effort. Programs to improve the captives' well-being and release captive-born giant pandas cannot be successful without a thorough understanding of the animal in nature (Mainka et al., 2004; Swaisgood et al., 2003; Schaller, 2004). Reintroduction is part of the rationale for keeping giant pandas in captivity, but scientists haven't recommended a single release, partly due to a lack of such knowledge (Mainka et al, 2004).

6. The Conflicts in Wolong Natural Reserve

The Wolong Nature Reserve is an example of the conflict between giant panda preservation philosophies. Perched in the deep forest of southwest China, the reserve is home to 150 wild giant pandas. It also hosts about 70 giant pandas in a captive breeding program that is tended by the biggest giant panda research institute in China—Wolong Research Center. Since WWF and the Chinese Ministry of Forestry negotiated jointly building the center in the 1980s, WWF scientists and their Wolong coworkers have gone through many conflicts and quarrels. In his book *The Last Panda*, George Schaller, the well-known American naturalist, who was the primary scientist of the program, detailed his “creeping despair” for the conservation program in Wolong (Schaller, 2004). The book claimed that the 1980s and 1990s, when an intensive effort was made to protect the giant pandas, was ironically a period of rapid decline for the wild giant pandas in Wolong. First, the Chinese spent large sums of money on elaborate, advanced laboratory equipment that was useless for basic research; second, the research center had built too many unnecessary breeding stations and set the hope of increasing reproduction by concentrating the wild animals in smaller areas; third, giant pandas attracted the greatest publicity ever and more giant pandas were sent overseas as rentals and goodwill gifts; fourth, poaching increased while the government failed to strengthen forest patrolling; fifth, the wild giant panda population and its natural habitat in Wolong was continually shrinking; And finally, little attention was paid to improving the captive well-being of the pandas. Captive animals were kept in small cages and conditioned to intimately interact with the keepers. By feeding the captives meat and encouraging their playful antics, the Wolong staff transformed the wild giant panda Zhen Zhen from a “wonderful” wild creature to a “panhandler” (Schaller, 1993).

The Last Panda (1993) provides the only detailed narrative about the values, politics and conflicts behind a Chinese giant panda research institute. Not only has it contributed precious knowledge to giant panda literature, but it also presents a vivid picture of the collision between modern science and traditional Chinese wildlife values. Although the Wolong reserve gloried in its “enormous” efforts in captivity breeding,

George Schaller believed that the protection program had harmed rather than helped the giant panda. Thus their work was merely a “modest postponement of defeat” as a whole (Schaller, 1993).

Discussion

The review of the general awareness about conservation operations in China supports Hypothesis 3: Since Chinese media content frames more concern for symbolic/dominionistic values and captive breeding of giant pandas than the ecology, habitat protection and well-being of wild-living giant pandas, general awareness and conservation activity in China reflects this pattern. China has a long history of worshiping giant pandas as a rare treasure, sending giant pandas overseas as gifts and renting them for exhibition. Even when the endangerment and fragileness of the species was fully acknowledged by modern science, China still sent giant pandas on foreign trips without careful biological considerations. It reveals a general attitude toward giant pandas that is more symbolic and utilitarian than scientific and ecological.

Because of the breeding defeat and high death rate in husbandry, China is fiercely criticized for capturing wild-ranging giant pandas and keeping far more captives than needed. Not much was done to improve the well-being of giant pandas in captivity. At the same time, the lack of support for field research has resulted in a dearth of basic knowledge: much needs to be known about the giant panda’s natural behavior pattern, the ecology and habitat. As a microcosm of China’s giant panda conservation efforts, the Wolong Nature Reserve demonstrates many of those problems.

The historical analysis results—the symbolic use of giant panda, the promotion of captive breeding, the lack of ecological consideration, and the sluggishness in field research and habitat protection—were all in accordance with the *People’s Daily* coverage (1995-2004). The newspaper framed more concern for the symbolic/dominionistic value and captive breeding of giant panda than the ecology, habitat protection and well-being of wild-living animals.

Although intensive debate about China's giant panda conservation operations is frequently read in books and peer-reviewed journals, *People's Daily* did not cover this controversy. 95 (64%) stories expressed absolute optimism for giant panda conservation in China; 4% showed negativity about the current conservation practice or the future of giant pandas; and very few clearly targeted criticisms were addressed. This phenomenon, however, is in accordance with the second observation of the newspaper content analysis: the Chinese governmental sources, especially influential institutions such as Wolong Research Center and Chengdu Breeding Base, were the dominant source of the newspaper report. As the biosocial reciprocal framework suggests, the mass media construct images of the environmental issues that reflect the power and ideology of a society's dominant institutions. Since the other side of the debate came mainly from international domains and much smaller Chinese research agencies, it was not equally carried in the newspaper report.

ENVIRONMENTAL CHANGES FOR GIANT PANDAS

Hypotheses

H4. The change of the physical conditions of the giant panda reflects Chinese people's attitudes and behavior about giant panda conservation.

Biosocial reciprocal framework suggests studying environmental communication and attitude in the context of actual environmental conditions. Luckily for the giant panda case, previous studies and surveys accumulated sufficient data about the physical changes that occurred after the 1950s. The physical conditions under review include the giant panda's habitat and its population in the wild and in captive.

Historical Review

1. The Loss of Habitat

In the late 1970s, the first giant panda survey counted approximately 1,100 wild individuals (Pan, 2002). The latest survey (1999-2002) estimates 1,600 wild pandas

(Smithsonian, 2005). Yet scientists say this figure does not necessarily suggest an increase of the wild population; the rise in number is more likely a result of different methods used by the two surveys (Lindburg & Baragona, 2004). Although precise alteration of the wild population is difficult to trace, the past few decades shows an obvious loss of giant panda's natural habitat.

Habitat loss and poaching are identified as the major threats for giant panda (Dinerstein et al., 2004). The National Conservation Management Plan for the Giant Panda and its Habitat (MOF and WWF, 1989) concluded: "The greatest threat to the giant panda is people. The overall decline of the panda is not a story of flowering bamboo, it is a story of a species pushed out of its habitat by human expansion. ...The advances of human farming, logging, hunting, and grazing of livestock over the last 150 years have resulted in considerable degradation and fragmentation of original panda habitat."

The giant panda's range once extended throughout much of southern and eastern China, as far north as Beijing and as far south as neighboring Burma and North Vietnam. In the past, giant pandas were removed from most of their ranges by hunting and forest destruction. Today, they exist only in six isolated mountain ranges scattering along the eastern edge of the Tibetan highlands (WWF, 2005). Despite several decades of contemporary effort, however, new monitoring shows a continuing loss of suitable wildness habitat and an increasing activity of hunting and herbal collection in giant panda habitats in recent years (Loucks, 2001; Liu et al., 2001; Mainka et al, 2004; Dinerstein et al., 2004).

By 1978, only 20% of panda habitat was protected in reserves. The remaining 80% was still open to commercial logging (Pan, 2002). From 1960 to 1990, 30% percent of forests vanished in Sichuan province, one of the panda's primary home ranges (Catton, 1990). Between 1975 and 1989, more than 50% of giant panda habitat gave way to agriculture and logging (Lu & Schaller, 2002; Schaller, 2004). Until 1998, most panda provinces still relied largely on timber production as the main industry (Lu & Schaller, 2002). In Pingwu County of Sichuan—home of the densest concentration of wild giant

pandas with 300 inhabitants—80% of the habitat was open to timber operations until 1996 (Loucks et al. 2001).

Poaching remains a serious threat to the wild giant panda population (Hu, 1998; Loucks et al., 2001). It is estimated that between 1987 and 1998, the Chinese authority had confiscated 52 giant panda pelts; this is probably an underestimated death toll because not all illegal shootings were caught (Li et al, 2000). Between 1989 and 1993, 153 illegal trading cases involving the giant panda were handled (Li et al, 2000). Between 1985 and 1991, 123 giant panda poaching cases were handled (Schaller, 1993).

Even in nature reserves where commercial logging is banned, the destruction and degradation of forest vegetation develops at a worrisome pace. In Wolong Nature Reserve, 14 square km forests were lost between 1975 and 1983 after the reserve was established (De Wulf et al., 1988). More dramatically, studies show a sharp drop of Wolong's wild giant panda population: from 145 in 1974 to 72 in 1986 (Catton, 1990). This was believed to be the result of the increased poaching and accidental snaring in Wolong during that period (Schaller et al., 1985; Schaller, 1993). Recent studies show that both the quantity and quality of the giant panda habitat in Wolong continues to decline, and the rates of loss and fragmentation of high-quality habitat have been even higher since Wolong reserve was established as in 1975 (Liu et al., 2004; Liu et al., 2001). The increasingly isolated population has further increased the probability of extinction due to the loss of genetic variability to inbreeding (Schaller et al., 1985).

2. The Improvement of Captive Breeding

Together with the habitat loss is an upsurge in the number and survival of captive-born young. In recent years, giant panda husbandry in China has improved dramatically. From 1990 to 2000, the cub survival rate reached 61%, with 66 cubs living more than 6 months. From 1998 to 1999, 22 new cubs survived, a survival rate of 76% (Ellis et al., 2004). This survival rate doubled between 1963 to 1989 (Ellis et al., 2004). The Wolong Research Center proclaimed 2000 “a year of miracles”: 11 captive female pandas were in estrus, 12 pandas were born in 8 litters, 11 of them survived for a

survival rate of 91.6% (CCRCGP, 2005). Both the pregnancy rates and the survival figures set a “world record” (CCRCGP, 2005). Wolong claims a 100% of survival rate in the past few years (CCRCGP, 2005). Good news is heard from other captive facilities in China. The Chinese captive facilities have won international recognition for having remarkably increased their success at breeding giant pandas (Schaller, 2004).

Discussion

The review of giant panda’s population and natural environment changes reveals a clear picture of serious loss of habitat to human consumption and continuing loss of wild giant pandas to poaching and unintentional snaring. These dangers to wild giant pandas did not disappear after China took serious steps to protect the species in the 1950s. The degradation of habitat, and the loss of wild population to poaching, both inside and outside the nature reserves, has ironically increased. In contrast to the dimming situation in the wild, the captive panda population has greatly increased nationwide.

These physical changes echo the general pattern of China’s media coverage that was revealed from previous analysis: the Chinese have put enormous efforts on captive breeding, while lagging in field research and habitat protection. Hypothesis 4 thus has been retained: the change of the physical conditions of the giant panda reflects Chinese people’s attitudes and behavior about giant panda conservation.

NEW TRACK FOR GIANT PANDA CONSERVATION

Hypothesis

H5. The change of the current awareness and practice in giant panda conservation reflects the feedback from the changes of the giant panda’s physical conditions.

In the new century, a number of new policies and strategies for giant panda conservation have been announced and implemented. Many of these are regarded as major breakthroughs in the protection of the species (Lindburg & Baragona, 2004).

According to biosocial reciprocal theory, the change of people's attitudes and behavior is influenced by the changes of the physical environment. In order to uncover the possible links, this study goes further to examine the latest changes and trends in China's giant panda conservation.

Historical Review

Recent years have seen increasing efforts to protect the natural environment in China. Conservation of natural forests has, for the first time, been designated as an urgent task by the highest level of Chinese government. The start of these sweeping changes is mostly identified by a national ban on logging in natural forests in 1998 (Loucks et al. 2001). The ban was directly triggered by a ferocious flood that struck China in the same year. Since then, more restoration policies have been put into effect, including the "Grain to Green" project in 2000. The project aims to convert heavily cultivated land to forests or grassland and claims to be the largest long-term conservation project in China's history (Li, 2003). A second \$30 million initiative to expand China's protected areas in the next 30 years is under negotiation (Lindburg & Baragona, 2004).

A similar trend toward environmental protection is seen in giant panda conservation. In the late 1990s, China has started taking significant steps to protect giant pandas in their habitat (Dinerstein et al, 2004; Lindburg & Baragona, 2004): over 20 new reserves have been established, with 40 reserves now covering 50% of the giant panda range (WWF, 2005); nature reserve now receive training in forest patrolling and wildlife monitoring (Schaller, 2004); a comprehensive national survey of the habitat and wild giant panda population has been completed (1998-2002) (Lu & Liu, 2004; Yu & Liu, 2004); an 11-year ban on commercial timber cutting has been implemented in all the remaining giant panda ranges outside the current nature reserves (Loucks et al., 2001); a US-China agreement in 1998 requires that all panda exportation must fund research for increasing wild populations (Lindburg & Baragona, 2004); in 2000, Chinese panda caretakers met to discuss how to improve the physiological and psychological well-being of captive pandas (Swaigood et al, 2003); some captive facilities began

cooperating with international sources in constructing bigger enclosures and improving animal-keeper interactions (Swaisgood et al., 2001); and several new international research programs have been initiated to accumulate funds and knowledge for securing a safer panda habitat (Lindburg & Baragona, 2004).

In Wolong Nature Reserve, several forest conservation programs are under way, including an initiative that pays local households to take care of a specific forest area (Liu et al., 2004). In order to reduce the collection of wood for fuel use, Wolong set up an eco-hydropower station for the local residents (Liu et al., 2004). Researchers are training a male giant panda Xiang Xiang for a possible release. It will be the first reintroduction in the history of giant panda conservation if it succeeds (CCRCGP, 2005). In addition, several research teams have studied the ecologic, demographic and socioeconomic issues in Wolong (e.g. An et al. 2001; 2002; 2005; Liu et al. 2001; 2003; Linderman et al. 2004). These studies have collected the first extensive socioeconomic and environmental data about local households, bamboo forest and giant panda habitat (An et al., 2005).

Experts applaud the recent changes in China's giant panda conservation policies. The orientation toward habitat protection is regarded as a major breakthrough (Lindburg & Baragona, 2004). George Schaller, who was filled with "creeping despair" about China's panda bear conservation 20 year ago, sees "hope, optimism and opportunity" in the new millennium for the giant panda's future (Schaller, 2004).

Discussion

According to the above analysis, the giant panda protection policies and practice, as well as China's environmental conservation as a whole, is becoming more oriented toward habitat protection. Newly developed conservation strategies and policies aim to secure a suitable habitat for the giant panda and to improve the number and quality of the wild population. Although there are still drawbacks in giant panda conservation including the ban on radio-collars and the lack of research on freeing captive giant

pandas (Schaller, 2004), the recent trend toward conserving a healthy wild population has never before happened in China's giant panda conservation history.

The current improvement of conservation awareness in conservation policies and operations reflects the changes of the physical conditions: the serious damage of giant panda habitat after 1950s and the continuing loss of wild giant panda population. Object realities influence and guided people's perception and actions (Nickerson, 2003). In this case, when years of conservation efforts and millions of dollars resulted in a higher risk of the species' extinction, a demand for urgent action to re-examine the policies and revise the situation are intrigued. The change in conservation strategy thus reflects this demand of action and retains hypothesis 5.

CHAPTER V

CONCLUSION

Human society has been co-evolving with the natural environment, changing nature and being changed by nature. Mass media, as well as many other social elements, are actively engaged in this grand process. *Biosocial reciprocity* suggests a framework for environmental communication study to assess mass media-related linkages between the social and the physical world:

- P1. Mass media construct images of the environment on issues that reflect people's existing attitudes, and the power and ideology of a society's dominant institutions.
- P2. Mass media influence people's attitudes on environmental issues.
- P3. The attitudes people have of an environmental issue will change the environment targeted by the issues.
- P4. The changes of the physical environment will feedback to change people's attitudes on related environmental issues.

Guided by the *biosocial reciprocity* framework, this study analyzed the image construction of the giant panda in *People's Daily*, as well as the general awareness, conservation operations and policies, environmental changes and ongoing protection of China's giant panda. All five hypotheses of the biosocial reciprocity framework are supported by the study results:

H1. The images of the giant panda and its conservation constructed by Chinese media reflect the Chinese attitudes toward wildlife—more utilitarian, dominionistic and symbolic than ecologically aware.

H2. Mass media coverage of the giant panda in China reflects the influence of powerful institutions such as government agencies and state-owned research centers.

H3. As Chinese media content frames more concern for the symbolic/dominionistic value and captive breeding of giant panda than the ecology, habitat protection and well-being of wild-living giant pandas, general awareness and conservation activity in China reflects this pattern.

H4. Changes in the physical environment of the giant panda reflect Chinese people's attitudes and behavior about giant panda conservation.

H5. The change of the current awareness and practice in giant panda conservation reflects the feedback from the changes of the giant panda's physical conditions.

The verification of these hypotheses strongly suggests the media-related interrelationships proposed by *biosocial reciprocity* theory: the images of giant panda constructed by *People's Daily* is an integrative reflection of the Chinese society, culture, ideology and existing attitudes toward wildlife and the giant panda. Yet in return, the media maintain and strengthen the ideology and attitudes by the selection and framing of information. They better presents the value of the government and certain influential institutions, thus reinforces the Chinese worship to the "national treasure" and indifference to wildlife and ecology. In this way, the Chinese media may influence people's attitude toward giant panda and further contribute to the physical changes in the giant panda's environment . The changes of the environment, which include degradation of habitat and loss of wild population, may have alarmed people and created new perceptions and recognitions about giant panda protection. This shift in public perception has resulted in the current modification of policies and operations toward more ecology-oriented conservation plans. The new perceptions, operations and policies, together with the environmental changes, will eventually be caught and spread by the mass media and give rise to a new round of mass media-environment interaction. As *biosocial reciprocity* theory suggests, the interaction between mass media, people's attitude and the environment is a multilateral, actively interacting and continuously processed system.

Although numerous social, economic and ecologic factors participate in the process of giant panda conservation and environmental changes, the *biosocial reciprocity framework* provides a helpful approach to sort out the mass media-related linkages. In the reciprocal interactions, the Chinese people's attitude toward wildlife and giant panda, as one of the major determinants of the country's conservation practice,

is the bridge that allows information and energy exchange between mass media and the environment. The recognition of “people’s attitude” as the hub of the *biosocial reciprocity* system leads to a broader insight: how to encourage mass communication’s positive impact on people for China’s conservation challenges.

COMMUNICATING THE GIANT PANDAS FOR CONSERVATION

Living on one-fifteenth of the world's land, the 1.3 billion Chinese people make up one-fifth of the world population. With ambitious economic development, China is going through the worst environmental destruction and exploitation of natural resources in today’s world. Given its important position on global biodiversity, it would be impossible to protect the global environment if the Chinese continue to “buy, build and consume as if there were no tomorrow” (Harris, 2004). China is one of the biggest culprits for global loss of biodiversity and wildlife habitat. The country’s variety of wild plants and animals is greater than that of either North America or Europe, and equal to one-eighth of all species on Earth (Raven, 1995). However, at least eight large mammal species are believed to have been made extinct in the past century alone, and 33 large mammals are projected to become extinct in this century. (Yu & Xing, 1995). According to statistics from Chinese State Forestry Administration, by 2010, 3,000 to 4,000 plant species will become extinct in China. Among the 640 endangered species listed in the United Nations Convention on International Trade in Endangered Species (CITES), 156 species are in China (WWF China, 2005).

The hope for solving China’s environmental problems can be secured only by a new set of environmental values that is widespread at the grassroots (Harris, 2004). Mass media, with its significant influence on people’s attitude towards nature, can be of great help in protecting the natural environment. Much work needs to be done to improve the role of mass media in China’s contemporary conservation campaign. The giant panda can be a strong conservation symbol for mass communication to raise public awareness and support for conservation. Giant pandas arouse emotions, sympathy and curiosity in the broadest of publics as a representative of an endangered species (Martin, 2002). The

Chinese media have successfully helped to spread this conservation symbol out to the public. Yet more efforts are needed to improve the effectiveness of the communication of this conservation icon.

COMMUNICATING THE VALUE BEHIND CONSERVATION

The giant panda case study shows an ironic fact: the worst damage to giant panda population happened after China took extensive efforts to save the species. It is a demonstration for the power of environmental values: good-intentioned efforts can lead to destructive outcome if it is not braced by science-based attitudes. In China, it is still common to hear people saying that “if the government wants to protect the wildlife, please put the animal into the zoo” (Zhang & Wang, 2003).

People’s Daily framed a picture of the giant panda’s care-free life in its safe harbor, the zoos and captives facilities. Not much account was given to the protection of habitats, the relationship between habitats and human life, and the value, biology and welfare of the wild animal itself. Other than an important member of the ecological community, the giant panda was portrayed as a fragile, precious pet-like animal that is tendered under human care.

This study suggests that effective conservation communication is not only a matter of how extensive and frequent the conservation signals reach the public, but more importantly which signals and images reach the public. It argues that giant panda communication in China has limited influence in cultivating Chinese respect for nature and wildlife, and in promoting environment-friendly attitudes and behavior.

COMMUNICATING THE SCIENCE BEHIND CONSERVATION

The *People’s Daily’s* giant panda stories also lacked scientific explanations of conservation efforts. Without digging into the scientific background, most stories float on the surface of events and activities such as a newborn in the zoo or giant panda being gifted abroad. The stories about research were mostly associated only with abstract

numbers, especially “good-looking” numbers that demonstrated the success of making more giant pandas in the zoo.

When it comes to environmental issues, informing people about potential losses and benefits is believed to be the most powerful weapon to affect public concerns, enhance understanding and obtain supports (Lindburg & Baragona, 2004; Xu & Jim, 2002). The Chinese media ought to fulfill the most essential function of mass communication—to describe and to educate.

ENGAGING SCIENTISTS AND SCIENCE COMMUNITIES

Although *People’s Daily* showed a preference for using certain influential research institutes as its sources, the voice of scientists in its giant panda coverage is generally low. Smaller giant panda research communities were seldom presented, and individual scientists were rarely quoted.

This study argues that the *People’s Daily* giant panda images reflect the images and values of influential institutes in China. For example, Wolong Research Center is the most frequently cited sources. The center has long had a research focus on giant panda artificial breeding. It is dedicated to fundraising from government agencies, individuals and international sources. Thus its websites, pamphlets and magazines are characterized by a promotion of its institutional success in captive breeding. The number of new giant panda bears born by artificial breeding and the healthcare of captive giant pandas, as a more tangible measure of its work, are naturally placed high on its communication agenda. Pictures of scientists holding giant panda bears or keepers feeding a group of giant panda abound alongside stories about the “happy” life of panda raised by the institutes. Onsite activities such as holding or feeding giant pandas are promoted as attractions to donors and visitors. In addition, the Wolong Research Center is government-sponsored, which also dye their communication products with a touch of political color. All these dimensions are reflected in the dominant mass media images found in this study.

If science communities are to have meaningful impact on public, they ought to devote more resources to improving their interactions with mass media (Domfeh, 1999). It is important that scientists actively participate in the communication of environmental issues. When there are only a few scientists and scientific communities active in public communication, the media tend to take the most available information, which may lead to journalism bias. If more scientists in the field of conservation, especially controversial issues, make their study and consultation accessible to the mass media, the journalists are more likely to be able to portray accurate, informative and balanced conservation stories.

SECURING THE FURTHER OF WILDLIFE IN CHINA

The role of mass media is a “great river”:

It feeds the ground it touches, following the lines of existing contours but preparing the way for change over a long period. Sometimes it finds a spot where the ground is soft and ready, and there it cuts a new channel. Sometimes it carries material which helps it to alter its banks. And occasionally, in time of flood, it washes away a piece of ground and gives the channel a new look (Rivers & Schramm, 1969).

If managed properly, the power of this river can notably alter the course of environment conservation. In the battle of preventing environmental catastrophes, the key character is people—human attitudes and behaviors are tightly interwoven with the preservation of nature and wildlife. Mass media can interact with the natural environment and influence people’s attitude toward nature. Mass media can spread the awareness that if ecological systems continue to make way for development, many creatures, including human beings, could lose the beautiful world that all species share and survive.

REFERENCES

- Ader, C.R. (1995). A longitudinal study of agenda-setting for the issue of environmental pollution, *Journalism & Mass Communication Quarterly*, 72, 300–311.
- An, L., Linderman, M., Qi, J., Shortridge, A., & Liu J. (2005). Exploring complexity in a human-environment system: An agent-based spatial model for multidisciplinary and multiscale integration. *Annals of the Association of American Geographers*, 95(1), 54–79.
- An, L., Liu, J., Ouyang, Z., Linderman, M.A., Zhou, S. & Zhang, H. (2001). Simulating demographic and socioeconomic processes on household level and implications on giant panda habitat. *Ecological Modeling*, 140, 31–49.
- An, L., Lupin, F., Liu, J., Linerman, M.A., & Huang, J. (2002). Modeling the choice to switch from fuelwood to electricity: Implications for giant panda habitat conservation. *Ecological Economics*, 42 (3), 445–457.
- Arcury, A.T. (1990). Environmental attitude and environmental knowledge. *Human Organization*, 49, 300–304.
- Atwater, T., Salwen, M., & Anderson, R. (1985). Media agenda-setting with environmental issues. *The Journalism Quarterly*, 62, 393–397.
- Backes, D. (1995). The biosocial perspective and environmental communication research. *Journal of Communication* 45, 147–163.
- Begley, S. (1993, April 12). Killed by kindness. *Newsweek*, pp, 50–56..
- Besley, J., & Shanahan, J. (2004). Skepticism about media effects concerning the environment: examining Lomborg’s hypotheses. *Society and Natural Resources*, 17, 861–880.
- Bonnicksen, T. (1991). Managing biosocial systems: A framework to organize society-environment relationships. *Journal of Forestry*, 89, 10-15.

- Bonnicksen, T., & Lee, R. (1982). Biosocial systems analysis: An approach for assessing the consequences of resource policies. *Journal of Environmental Management, 15*, 47–61
- Burgess, J. (1990). The production and consumption of environmental meanings in the mass media: A research agenda for the 1990s. *Transactions of the Institute of British Geographers, 15*: 139–161.
- Catton, C. (1990). *Panda*. New York: Facts on File Publications.
- CCRCGP (China Conservation and Research Center for Giant Panda). (n.d.) Retrieved August 20, 2005, from <http://www.pandaclub.net/view.jsp?tipid=1112860322593>.
- Corbett, J. (1992). Rural and urban newspaper coverage of wildlife: conflict, community and bureaucracy. *Journalism Quarterly, 69*, 929–937.
- Curtin, P., & Rhodenbaugh, E. (2001). Building the news media agenda on the environment: A comparison of public relations and journalistic sources. *Public Relations Review, 27*, 179–195.
- De Wulf, R., MacKinnon, J. R., & Cai, W.S. (1988). Remote sensing for wildlife management: Giant panda habitat mapping from LANDSAT MSS images. *Geocarto International, 1*, 41–50.
- Dinerstein, E., Loucks, C., & Lu, Z. (2004). Biological Framework of Evaluating Future Efforts in Giant Panda Conservation. In D. Lindburg, & K. Baragona (Eds.), *Giant Panda Biology and Conservation* (pp. 228–233). Berkeley: University of California Press.
- Domfeh, K.A. (1999). Evaluation of environmental news coverage in Ghana. *Environmental Health, October*: 27–32.
- Einsiedel, E. (1988, July). *The Canadian press and the environment*. Paper presented at the sixth conference of the International Association for Mass Communication Research, Barcelona, Spain.
- Ellis S., Zhang, A., Zhang, H., Zhang, J., Zhang Z., Lam, M., Edwards, M., Howard, J., Janssen, D., Miller, E., & Wildt D. (2004). Biomedical Survey of Captive

- Giant Pandas. in Giant Panda Conservation. In D. Lindburg. & K. Baragona (Eds.), *Giant Panda Biology and Conservation* (pp. 250–263). Berkeley: University of California Press.
- Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, 43 (4), 51–58.
- Gallagher, W. (1993). *The Power of Place*. New York: Poseidon Press.
- Gandy, H.O. (1982). *Beyond Agenda Setting: Information Subsidies and Public Policy*. Norwood, New Jersey: ABLEX Publishing Company.
- Garling, T. & Evans. (Eds.) (1991). *Environment, Cognition, and Action: An Integrated Approach*. New York: Oxford University Press.
- Gitlin, T., (1980). *The Whole World Is Watching: Mass Media in the Making and Unmaking of the New Left*. Berkeley: University of California Press.
- Glaser, B.G., & Strauss A.L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine.
- Griffin, R. & Dunwoody, S. (1995). Impacts of information subsidies and community structure on local press coverage of environmental contamination. *Journalism and Mass Communication Quarterly*, 72, 271–284.
- Hansen, A. (1991). The media and the social construction of the environment. *Media, Culture and Society*, 13, 443–458.
- Harris, P.G. (2004). Getting rich is glorious: Environmental values in the People's Republic of China. *Environmental Values*, 13, 145–165.
- Harris, R.B. (1996). Approaches to conserving vulnerable wildlife in China: Does the color of cat matter—if it catches mice. *Environmental Values* 5(4), 303–334.
- Harris, R.B. (1991). Conservation prospects for musk deer and other wildlife in southern Qinghai, China. *Mountain Research and Development*, 11, 353–358.
- Holbert, R.L., Kwak, N. & Shah, D. (2003). Environmental concern, patterns of television viewing, and pro-environmental behaviors: Integrating models of media consumption and effects. *Journal of Broadcasting & Electronic Media*, 47, 177–196.

- Hu, J. (1998). *Ailuropoda melanoleuca*. In S. Wang (Eds.). *China Red Data Book of Endangered Animals* (p.p.158–165). Beijing, China: China Science Press.
- Jenkins, T.N. (2002). Chinese traditional thought and practice: lessons for an ecological economics worldview. *Ecological Economics*, 40: 39–52.
- Jin, L. (2002). *Newspaper converge of agricultural biotechnology in mainland China: The hegemony theory reexamined*. M.S. Thesis, Texas A&M University.
- Kaplan S., & Kaplan, R. (1978). *Humanscape: Environments for People*. North Scituate, Massachusetts: Duxbury Press.
- Kellert, R. S. (1996). *The Value of Life: Biological Diversity and Human Society*. Washington D.C.: Island Press.
- Krader, L. (1970). Environmental threat and social organization. *Annals of the American Academy of Political and Social Science*, 389, 11–18.
- Krendl, K.A., Olson, B., & Burke, R. (1992). Preparing for the environmental decade: A field experiment of recycling behavior. *Journal of Applied Communication*, 20, 19–36.
- Krippendorff, K. (1980.) *Content Analysis: An Introduction to Its Methodology*. Beverly Hills, California: Sage Publications.
- Li, Chao. (2003, March). Report suggests China's "Grain-to-Green" plan is fundamental to managing water and soil erosion. Retrieved September 1, 2005 from <http://www.wwfchina.org/english/loca.php?loca=159>.
- Li, Y., Gao, Z., Li, X., Wang, S. and Niemela, J. (2000). Illegal wildlife trade in the Himalayan region of China. *Biodiversity and Conservation*, 9, 901–908.
- Li, Y., Guo, Z., Yang, Q., Wang, Y., & Niemela, Jari. (2003). The implications of poaching for giant panda conservation. *Biological Conservation*, 111, 125–136.
- Lindahl, R. (1993). Media concentration on local political campaigns. *Gazette*, 31, 99–115.
- Lindburg, D., & Baragona, K. (Eds.). (2004). *Giant Panda Biology and Conservation*. Berkeley: University of California Press.

- Linderman, M., Liu, J., Qi, J., Ouyang, Z., An, L., Yang, J., & Tan, Y. (2004). Using artificial neural networks to map the special distribution of understory bamboo from remote sensing data. *International Journal of Remote Sensing*, 25(6), 1685–1700.
- Liu, J., Ouyang, Z., Zhang, H., Linderman, M., An, L., Bearer, S., & He, G. (2004). A new paradigm for panda research and conservation: Integrating ecology with human demographics, behavior and socioeconomics. In D. Lindburg. & K. Baragona (Eds.), *Giant Panda Biology and Conservation* (pp. 217–225). Berkeley: University of California Press.
- Liu, J., Daily, G.C., Ehrlich, P.R., & Luck, G.W. (2003). Effects of household dynamics on resource consumption and biodiversity. *Nature*, 421, 530–533.
- Liu, J., Linderman, M., Ouyang, Z., An, L., Yang, J., & Zhang, H. (2001). Ecological degradation in protected areas: The case of Wolong Nature Reserve for giant pandas. *Science*, 292, 98–101.
- Lombardo, T.J. (1987). *The Reciprocity of Perceiver and Environment: The Evolution of James J. Gibson's Ecological Psychology*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
- Lomborg, T. (2001). *The Skeptical Environmentalist: Measuring the Real State of the World*. Cambridge, UK: Cambridge University Press.
- Loucks, C.J., Lu, Z., Dinerstein, E., Wang, H., Olson, D., Zhu, C., & Wang, D. (2001). Giant panda in a changing landscape. *Science*, 294: 1465.
- Lu, Z., & Liu, Y. (2004). China's National Plan for Conservation of the Giant Panda. In D. Lindburg. & K. Baragona (Eds.), *Giant Panda Biology and Conservation* (pp. 226–227). Berkeley: University of California Press.
- Lu, Z., Pan, W., Zhu, X., Wang, D., & Wang, H. (2000). What Has the Giant Panda Taught Us? In A. Entwistle & N. Dunstone (Eds.). *Priorities for the Conservation of Mammalian Diversity—Has the Panda Had Its Day?* (pp. 325–334). Cambridge: Cambridge University Press.

- Lu., Z., Pan, W., & Harkness, J., (1994). Mother-cub relationships in giant pandas in the Qinling Mountains, China— with comment on rescuing abandoned cubs. *Zoo Biology*, 13, 67–68.
- Lu. Z. & Schaller G.B. (2002). *Giant Panda in the Wild*. New York: Aperture.
- Mainka, S. & Lu, Z., (Eds.). (1999). *International Workshop on the Feasibility of Giant Panda Re-introduction*. Beijing: China Forestry Publishing House.
- Mainka, S., Pan, W., Kleiman, D. & Lu, Z. (2004). Reintroduction of Giant Pandas. In D. Lindburg. & K. Baragona (Eds.), *Giant Panda Biology and Conservation* (pp. 246–249). Berkeley: University of California Press.
- Martin, C. (2002). Foreword. In Z. Lu. & G.B. Schaller (Eds.). *Giant Pandas in the Wild* (pp. 11–12). New York: Aperture Foundation.
- Mazur, A. (1987). Putting Radon on the Public’s Risk Agenda. *Science, Technology, and Human Values*, 12, 86–93
- Mazur, A. (1998). Global environmental change in the news. *International Sociology*, 13, 457–472.
- McComas, K., Shanahan, J., & Butler, J. (2001). Environmental content in prime-time network TV’s non-news entertainment and fictional programs. *Society and Natural Resources*, 14, 533–542.
- McCombs, M. & Shaw, D. (1972). The agenda-setting function of the mass media, *Public Opinion Quarterly*, 36, 176–87.
- MOF & WWF (Chinese Ministry of Forestry and World Wildlife Fund). (1989.) *The National Conservation Management Plan for the Giant Panda and Its Habitat*. Beijing, China: MOF & WWF.
- Morris, R. & Morris D. (1966). *Men and Pandas*. New York: McGraw-Hill.
- Nickerson, S.R. (2003). *Psychology and Environmental Change*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
- Orians, G.H. (1986). An Ecological and Evolutionary Approach to Landscape Aesthetics. In Penning-Rousell & D. Lowenthal (Eds.). *Landscape Meanings and Values*. London: Allen & Unwin.

- Pan, W. (2002). The History of Panda Research: From Wolong to Qinling. In Lu Z. and Schaller G.B. (Eds.). *Giant Panda in the Wild* (pp.13–17). New York: Aperture.
- Pan, W., Lu. Z., Zhu, X., Wang, D., Wang, H., Long, Y., Fu, D. and Zhou, X. (2001). *A Chance for Lasting Survival*. Beijing: Peking University Press.
- Pan., Z., and Kosicki, G.M. (1993). Framing analysis: An approach to news discourse. *Political Communication*, 10, 55–75.
- Podeschi, C. (2001). The nature of future myths: Environmental discourse in science fiction film, 1950-1999. *Sociological Spectrum*, 22, 251–271.
- Raven, P. (1995). Biodiversity and the future of China. *Pacific Science Association Information Bulletin* 47, 1–8.
- Rivers, W.L. and Schramm, W.D. (1969). *Responsibility in Mass Communication*. New York: Harper and Row.
- Russell, J.A., & Ward, L.M. (1982). Environmental psychology. *Annual Review of Psychology*, 33, 651–688.
- Schaller, G.B. (1993). *The Last Panda*. Chicago: The University of Chicago Press.
- Schaller, G.B. (2004). Foreword. In D. Lindburg. & K. Baragona (Eds.), *Giant Panda Biology and Conservation* (pp. xi–xii). Berkeley: University of California Press.
- Schaller, G. B., Hu, J., Pan, W. & Zhu, J. (1985). *The Giant Pandas of Wolong*. Chicago: The University of Chicago Press.
- Shanahan, J. & Butler, J. (2001). Environmental content in prime-time network TV's non-news entertainment and fictional programs. *Society and Natural Resources* 14, 533–542.
- Silverstone, R. (1985). *Framing Science: The Making of a BBC Documentary*. London: BFE.
- Smithsonian, Giant panda facts. (n.d.). Retrieved September 8, 2005, from <http://nationalzoo.si.edu/Animals/GiantPandas/PandaFacts/default.cfm>.

- Stamm, K.R., Clark F. & Eblacas P.R. (2000). Mass communication and public understanding of environmental problems: the case of global warming. *Public Understanding of Science* 9: 219–237.
- Sterckx, R. (2002). *The Animal and the Daemon in Early China*. Albany: State University of New York Press.
- Swaigood, R.R., Ellis, S., Forthman, D.L. & Shepherdson, D.J. (2003). Commentary: Improving well-being for captive giant pandas: Theoretical and practical issues. *Zoo Biology* 22, 347–354.
- Swaigood, R.R., White A.M., Zhou, X., Zhang, H., Zhang, G., Wei, R., Hare, V.J., Tepper, E.M., & Linderburg, D.G. (2001). A quantitative assessment of the efficacy of an environmental enrichment programme for giant pandas. *Anim Behav* 61, 447–457.
- Tuchman, G. (1978). *Making News: A Study in the Construction of Reality*. New York: Free Press.
- Van Liere, K.D. & Dunlap, R.E. (1980). The social bases of environmental concern: a review of hypotheses, explanations and empirical evidence, *Public Opinion Quarterly*, 44, 181–197.
- Wall, G. (1999). Science, nature, and the nature of things: An instance of Canadian environmental discourse, 1960-1994. *Canadian Journal of Sociology*, 24, 53–85.
- Wolch, J., Gullo, A., & Lassiter, U. (2001). Changing attitudes toward California's cougars. *Society and Animals*, 5, 95–116.
- WWF, Giant panda facts. (n.d.). Retrieved September 1, 2005, from <http://www.worldwildlife.org/pandas/ecology.cfm>.
- WWF China, China's top 10 environmental problems . (n.d.). Retrieved October 20, 2005, from <http://www.wwfchina.org/english/loca.php?loca=4>.
- Xu, S.W. & Jim, C.Y. (2002). Stifled stakeholders and subdued participation: Interpreting local response toward Shimentai Nature Reserve in South China. *Environmental Management*, 30, 327–341.

- Yin, J. (1999). Elite opinion and media diffusion: Exploring environmental attitudes. *The Harvard International Journal of Press Politics*, 4(3), 62–86.
- Yu, C., & Liu, S. (2004). National Survey of Giant Panda. In D. Lindburg. & K. Baragona (Eds.), *Giant Panda Biology and Conservation* (pp. 234–235). Berkeley: University of California Press.
- Yu, C. & Xing, L. (1995). Status and Conservation Strategy of Endangered Mammals in China. In Biodiversity Committee, Chinese Academy of Sciences and Department for Wildlife and Forest Plant Protection, Ministry of Forestry (Eds.). *Advances in Biodiversity Research* (pp. 172–178). Beijing: Chinese Sciences and Technology Press.
- Zheng, S. & Zhao, Q. (1994). A Breeding Plan of Captive Giant Pandas. In A. Zhang, A., He, (Eds.) *Minutes of the International Symposium on the Protection of the Giant Panda* (pp. 22-32). Chengdu, China: Sichuan Science and Technology Press.
- Zhang, L. & Wang, N. (2003). An initial study on habitat conservation of Asian elephant (*Elephas maximus*), with a focus on human elephant conflict in Simao, China. *Biological Conservation* 112: 453–459.
- Zhao, Y. (1998). *Media, Market and Democracy in China: Between the Party Line and the Bottom Line*. Urbana: University of Illinois Press.
- Zhu, X., Lindburg, D., Pan, W., Forney K., & Wang, D. (2001). The reproductive strategy of giant pandas (*Ailuropoda melanoleuca*): Infant growth and development and mother-infant relationships. *J Zool Lond* 253, 141–155.

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