

Large Countries and Biodiversity Conservation:

China as Compared to the United States

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Abstract

This paper analyzes the contrasting approaches taken to biodiversity conservation by the world's third largest nation-state, China, as compared to the fourth, the United States. While the primary cause of loss in diversity of species, populations and ecosystems in China is over-exploitation, in the U.S. it is habitat destruction. Different historical trajectories, for example China's quasi-colonial circumstance from the Opium Wars to the end of World War II, express important social, cultural and political differences. In the U.S. case, the legislative orientation of species protection is distinctive. While both nations have roughly the same proportion of land sequestered into parks, refuges and reserves, the configuration of the two systems is different, with the U.S. having clearer lines of enforcement than China, which suffers from contradictions in policy and implementation.

Keywords: biodiversity conservation, endangered species, population, ecosystems, megadiversity, implementation deficit.

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Overview

A major global environmental problem is loss of biodiversity, given significant reductions in percentages for non-human animals, plants, amphibians, reptiles, and other taxonomic groups. This paper compares the approaches two large countries—China and the United States—have taken to preserve biological diversity and to lessen threats to rare and endangered species, populations and ecosystems.³ The countries have both significant similarities and differences, making the comparison atypical (Dogan & Pelassy, 1990).

China and the U.S. are, by territorial size, the third and fourth largest countries in the world. Although land forms are not identical, they both have commanding mountains, deep valleys, deserts, extensive grasslands, long rivers and coastlines. In 2016 the U.S. remains the world's largest economy and China is second, expected to surpass the U.S. by 2025⁴ (CEBR, 2014). Together they comprise nearly 40 percent of the global economic product (World Bank, 2015). The negative environmental footprints of the countries also are large, with China the world's largest producer of greenhouse gases, exceeding the U.S. level in 2007 (Leggett, 2011).

Yet there are major differences. China's population is more than four times larger than that of the U.S. (1.33 billion v. 324.4 million, the world's first and third largest). At a per capita basis, and notwithstanding a rising middle class and considerable poverty alleviation, Chinese on average are poorer than Americans. The age and nature of thought systems are dissimilar as

³Biodiversity as commonly defined includes ecosystems (communities of living organisms and the inorganic environments they inhabit); species (groups or organisms within ecosystems that interbreed; populations are subspecies); and the molecular, or genetic level. See J. W. Gibbons and Karen McGlothlin, "A Changing Balance," in *Loss of Biodiversity*, Sharon Spray & Karen McGlothlin, eds., Boulder, CO: Rowman & Littlefield, 2003, 30. Also see Epstein, 2006.

⁴It is unclear when China will overtake the U.S. in terms of GDP size, or whether it will at all. Among the uncertainties are the aging Chinese population and reform of China's domestic structures among other factors affecting the projection.

well. Having the world's longest continuous civilization, China benefits from an articulated thought system—traditional idea systems of Confucianism, Daoism, several variants of Buddhism and Marxist-Leninism (from the foundation of the People's Republic in 1949). All have important things to say about humans' relations to the natural world. The oldest U.S. thought system is that of the indigenous population, often referred to as Native American spirituality (Deloria, 2003). As North America was colonized, several strains of thought rationalized exploitation of nature for the benefit of European settlers incorporated in the “manifest destiny” concept of the 19th century. Preservationist thought developed by the turn of the 20th century.

The political and legal systems of the U.S. and China are quite different too. The framers of the U.S. Constitution developed a separation of powers system of government to protect liberty, among other reasons. While the judiciary lacked either power of the sword or purse, the longest-serving Supreme Court Chief Justice, John Marshall, successfully implemented judicial review in the case *Marbury v. Madison* (1803), with courts determining what the law was. Today, deference to the “rule of law” is a practice of most western democracies. China on the other hand is a party state, and the communist party (its leading unit, the politburo's standing committee), brooks no opposition to its control.

In this paper, we begin by specifying the problem of loss in diversity of species, populations and ecosystems. The causes are dissimilar in the two cases, because of different historical trajectories, as elaborated upon in the next section on socio-cultural differences (in which we also point out differences in the “market” for species and their critical habitats). The third section treats law and legal cultures, comparing the legislative architecture of species protection in the U.S. to that in China. Next we turn to protected areas (PAs)—the configuration of

reserves and parks established to preserve wild and precious species and habitats. Following this we examine the sharp difference between the administrative and implementation systems of China and the U.S. Finally, we make a comparative evaluation of the strengths and weaknesses of the two systems.

I. The Whys and Wherefores of Biodiversity Losses

China and the U.S. are among a small group (17) of “megadiverse” countries⁵; they have an exceptionally large range of species and much endemic biodiversity. The concept of megadiversity means that the countries have “hotspots,” areas with great concentrations of endemic species, and they also face grave threats to critical habitat of endangered species (Myers et al., 2000). A second factor frequently mentioned about biodiversity-rich countries is that they hold a significant percentage of the world’s species in their different phyla and taxonomic divisions. To be sure, however, we lack knowledge about the extent of imperiled species. Wilcove remarks that “only about 15% of the known species in the US have been studied in sufficient detail to determine their conservation status” (Wilcove & Master, 2016; *Science*, 2008). Similar remarks could be made about China.

China has a large number of hotspots, found in its southern provinces (particularly Yunnan); it also has a high percentage of total global species, for example 14 percent of mammals, 13.5 percent of birds, 20 percent of fish, 33.5 percent of freshwater algae and 29.4 percent of gymnosperm (McBeath & Leng, 2006). The U.S. has more large-scale ecosystem types than any

⁵Neither the world’s largest state, Russia, nor the second largest, Canada, is considered to be megadiverse.

other country; its diverse ecosystems house about 200,000 native species, constituting 10 percent of all species globally (Steelman, 2002).

Causes of species and population losses in the two countries are dissimilar. In China, the primary cause is over-exploitation (accounting for 46 percent of species losses), a consequence of very rapid economic development, especially since the onset of economic reform policies in 1978. (Li and Wilcove, 2005; Liu and Tian, 2010; Cao et al., 2010). Too, as we note below, species protection law in China allows continued utilization of natural resources, including areas that may be critical habitat for rare and precious species. Additional causes of species loss are habitat destruction, pollution, destruction by invasive species and diseases.

In the U.S., the ordering of factors is different. Habitat destruction is the major cause, attributable to economic activities such as agriculture and logging, followed by fishing, oil and gas exploration and development and mining. Other causes of species loss include invasives, pollution and diseases. Both China and the U.S. display evidence of climate warming, which in the last 30 years has produced many shifts in the distributions and abundance of species. One estimate is that by 2050, some 15-37 percent of species will be “committed to extinction” due to climate warming (*Nature*, 2004; Malcolm et al., 2006; Piao et al., 2010).

III. Socio-Cultural Differences

As pointed out above, the China-US differences in protection of species, populations and ecosystems are explained to a large extent by distinctive historical patterns and cultural evolution. In the case of China, a dynastic and imperial system was founded in the third century BCE, and the empire was not only a regional but on occasion a global center of power and influence. However, from the Opium Wars of the 19th century until the establishment of the

People's Republic in 1949, China underwent a "century of humiliation," which Chinese repeatedly mention in their interactions with westerners (and is evident more broadly in China's international behavior). This pattern of development certainly strengthened the national sense of needing to "catch-up" to other nations in the modern era. In Maoist China (1949 to 1976), the desire to overtake western powers in industrial development was seen in the Great Leap Forward (1958-61), one horrible example of what Judith Shapiro called "Mao's war against nature" (Shapiro, 2001). The economic reforms which Deng Xiaoping initiated in 1978 have continued to the present and definitely have emphasized economic development and rapid growth as the primary goals of the state. Only since the late 1990s have environmental issues aroused the interest of national leaders and the broader public (Marks, 2012). Although China was never colonized by a foreign power, in 2016 it leads the Third World (once colonized) states while itself close to entry into the economically developed state system. This historical trajectory, however, is different from that of the U.S., Canada, Japan and the European powers.

Although the United States celebrates in 2016 the 240th anniversary of the Declaration of Independence, it still retains many characteristics of a new nation. A colony of the United Kingdom in the 17th century, most inhabitants were immigrants who had crossed the Atlantic to leave the religious persecution, wars, and poverty of "old" Europe behind. Significantly, the origin date (1776) of the Declaration is also the publication year of Adam Smith's *The Wealth of Nations* (Smith, 2008), the foundation document of capitalism. Notwithstanding early state-sponsored economic activities of the late 18th and early 19th century (which among other effects marginalized the indigenous population), the U.S. underwent the world's second industrial revolution after the Civil War (ending in 1865). National leaders and the public broadly embraced goals of economic development at all costs, and this became the dominant

environmental perspective (Milbrath, 1985). A post-Civil War slogan of “Manifest Destiny” associated the economic drive of Americans with a new definition of national identity. However, by the late 19th century, closure of the frontier (as discussed in the Turner thesis of American history) and dissatisfaction with the trusts monopolizing transportation, raw materials production and the energy sector spawned the progressive movement. One dimension of this movement was preservation of national assets, expressed formidably in the Theodore Roosevelt administration’s creation of national parks, refuges and monuments (Fischman, 2003). The United States is considered a pioneer as well in the development of environmental laws and regulations, discussed below.

In the second dimension, cultural evolution, the two countries diverge as well. We have referred briefly to different traditional and philosophical positions regarding environmental issues (e.g., McBeath & McBeath, 2014), and here we ask what explains the role that individual activity and national markets play in biodiversity conservation. This pertains directly to the category of species loss described above as “over-exploitation,” and we compare the instrumental use of species and ecosystems in the two countries.

In the United States, the use of non-human species for medical purposes has been a modest factor in biodiversity loss. In the development of policy, for example in the area of fisheries, to bring protein to tables is a major factor. So, too, are sport and recreational uses of species as seen in the hunting (and fishing) lobbies so prevalent in western states of the U.S., and in the tourist interest focusing on wildlife-viewing. The commercial and recreational interests figure as combatting forces in the development of national policy, yet it has been possible to develop compromises and accommodations to satisfy opposing positions. Altogether these interests pale in importance when compared to alternate exploitation of the land forming critical habitat for

threatened and endangered species. The major conflicts of endangered species policy in the 43 year-history of the ESA have not been concern for over-exploitation of particular endangered species or populations but about whether land uses (e.g., oil and gas exploration and development, mining, logging) potentially will imperil the essential habitat of species such as the spotted owl, polar bear or western sage grouse.

As noted, over-exploitation of rare and precious species is the primary cause of biodiversity loss in China, for several reasons. First, traditional Chinese medicine is founded on the utilization of animal and plant species for their supposed benefits to humans. Here the examples are legion: for example, rhinoceros horns and tiger bones for their aphrodisiac properties, and ginseng root for the route it promises to longevity. Second, some threatened and endangered species, such as elephants, provide raw materials for artisans—e.g., tusks deemed essential for elaborate ivory carving. Third, some species satisfy exotic tastes, such as shark fins for soup, civet cats for meat. While there is a small market in the U.S. for wildlife products, in China the market is huge, posing serious problems for the state as a signatory to the CITES treaty (Reeve, 2002; Sharma, 2005). In short, the wildlife markets for rare and threatened species differ significantly when comparing China and the United States.

IV. The Law and Legal Culture

The “rule of law” is a western concept, developed over nearly 1,000 years from its origin in medieval Europe and then extended to European colonies such as colonial America and Canada (Sonnenfeld, 2012). The concept of law implies uniformity, so that standards can be applied universally within a given jurisdiction. It assumes a degree of specificity, so that it can be enforced without discrimination by the state. To make law a living force in human lives requires

agents who can interpret and contest it, meaning a special class of people (lawyers) and an arena in which their views can be contested (courts) and refereed (by judges whose job description requires impartiality). The rule of law is established in the United States but remains an aspiration in China, and this is a major factor distinguishing approaches to biodiversity conservation.

The U.S. law most relevant to biodiversity conservation is the Endangered Species Act (ESA), passed in 1973 by a nearly unanimous vote in the House of Representatives and by unanimous consent in the Senate. The law emphasizes three important procedures. First is a process for designating a species as threatened or endangered, which requires a judgement (a formal listing) of either the U.S. Fish & Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) that the species is highly at risk. Second is the requirement that before any federal action commences, the relevant agency (for example, the Army Corps of Engineers initiating construction of a dam or NMFS' approving a fisheries management plan) engages in consultations concerning threatened or endangered species, and issues a biological opinion spelling out how adverse impacts on species will be avoided. Third is the specification that USFWS or NMFS develop a recovery plan for the species (Hoekstra, 2002). While the focus of the law is on individual species (and on occasion populations), the critical habitats of species are implied in all three processes. ESA has been amended three times since 1973 (in 1978, 1982 and 1988; Scott, Goble & Davis 2006); and the amendments give agencies somewhat more flexibility in development of recovery plans. Since 1992 ESA has not been re-authorized by the Congress, an indication of how controversial it has become (primarily because of conservative complaints that it represents a vast "taking" of private property). Nevertheless, annual appropriations to agencies sustain the work needed to implement the law.

Related legislation in the United States fortifies protection of species and ecosystems. The authoritative source of contemporary environmental legislation is the National Environmental Policy Act (NEPA, 1969), which established the pattern of careful procedural review and consideration of alternatives whenever federal action seemed likely to threaten environmental values. Other important statutes include the Clean Water Act, the Clean Air Act, the Safe Water Drinking Act and legislation on toxic substances. In addition to federal (and state) laws, agencies such as USFWS and NMFS as well as federal departments have promulgated myriad regulations.

Although China cannot be called a “rule of law” state, it nonetheless pays serious attention to the formation and implementation of laws regarding species and ecosystem protections. A number of laws have addressed different aspects of biodiversity conservation. Laws offer the strongest degree of protection; they are enacted by the National People’s Congress, China’s supreme legislative body. Although quite broad and often more in the nature of policy statement than statute, the laws are transparent and enforceable (Xu et al., 2009).

Foremost among the laws is the Wildlife Protection Law (WPL) enacted by the NPC in 1988. This law charges the state to ensure the protection of wild animals and their habitats, to organize regular field surveys of wildlife resources, and to improve ecological impact assessment for construction projects. The law establishes two categories of protection for endangered or valuable species. The law sets quite high (some critics say unrealistically so) penalties for killing or trading in protected species (Sayer & Sun, 2003; Li, 2015).

The Chinese law on wildlife preservation is less broad than the American, as it omits plants and other non-vertebrate species. Like the American law, it implies protection of critical

habitats. Too, a number of other environmental laws figure into the realm of species and habitat protection. These include the Environmental Protection Law, adopted in 1979 (and amended in 1989); the Environmental Impact Assessment (EIA) taking effect in 2003; the Water Pollution Prevention Law of 1984 (revised in 1996); the Solid Waste Pollution Prevention Law of 1995, and the Air Pollution Prevention Law of 1987 (revised in 1995). Regulations of government ministries expand on these laws and provide more detail.

V. Protected Areas (PAs): The Landscape of Species Protection

Species require space, and land has been set aside in the form of parks and reserves both in the United States and China to protect biodiversity. The United States system is the world's oldest, beginning with establishment of Yellowstone Park in 1872. Major legislation includes the Wilderness Act of 1964, which appropriated federal public domain for wilderness and additional categories of protection to be determined in the future.

In the U.S., protected areas primarily are found on public lands. The federal public domain extends across 700 million acres, some 29 percent of the total U.S. land area. The lion's share of federal lands is in the American West, and they are a large percentage of total lands in such states as Alaska, Nevada and Wyoming. Each state has state-owned land, which may in eastern states comprise a larger portion of the total land areas than of federal lands. Of the federal public lands, protected areas are found in the categories of national parks, national forests, national monuments, wildlife refuges and wilderness areas. In 2000, they extended to 123 hectares or about 13 percent of the total U.S. land area (World Resources Institute, 2000). Adding PAs established in the 50 American states increases the overall total to about 14 percent (UNEP, 2015).

The U.S. Constitution assigns Congress the primary authority to determine how public lands, held in trust for the American people, will be used. Congress in turn has granted considerable discretion to federal agencies such as the Bureau of Land Management (BLM, of the U.S. Department of the Interior) and the Forest Service of the U.S. Department of Agriculture. Congress has shared with the president authority to withdraw public lands from private use, often at the behest of the Supreme Court. While protection of rare and precious species is less than robust in national parks, legislation such as the Wilderness Act protects 93 million acres from development, and in the most stringent protective category—national refugees—prohibits economic activities that would threaten endangered species and critical habitats (Rosenbaum, 2002).

The status of land in China differs sharply from the U.S., where most land is privately owned. In China, land may be leased but not owned outright by individuals or firms/organizations. In China, protected areas developed later than in the U.S. The greatest expanse of PAs lies in the western provinces, where population density is low. Some nature reserves are quite large; 19 exceed 10,000 square kilometers. In 8 provinces—Tibet, Xinjiang, Qinghai, Inner Mongolia, Sichuan, Gansu, Yunnan and Heilongjiang—nature reserves cover approximately 20 percent of the land area. These spaces (mostly in China’s west and southwest) have the highest levels of biodiversity. In the other provinces, nature reserves extend to only about 5 percent of the land area (Harris, 2007; McBeath & Leng, 2006).

Nature reserves in China are organized into three types: natural ecosystem, wildlife, and natural monuments. Ocean and coastal ecosystems are poorly covered; few PAs are established for plants. The political and administrative distribution of PAs is somewhat uneven. Just 226 of the 2600 PA (about 15 percent of the Chinese landscape) are national nature reserves, but these

are the largest in size, have the most biodiversity to protect, and are best-funded (prompting pressures to upgrade reserves from sub-national to national status). The remainder fall under the jurisdiction of provinces or autonomous areas, and are effectively controlled by one of three sub-national jurisdictions: provinces (or autonomous areas), municipalities, or counties (Xue and Jiang, 1995).

A series of questions emerges concerning the efficaciousness of PAs in the advancement of biodiversity conservation. In both countries, on several occasions, PAs have been referred to as “paper parks.” In the case of China, one informed critic calls the process of establishing parks and reserves “fortress conservation,” by which he means that the system is antithetical to the “needs, interests, and opportunities of local residents and communities” (Foggin, 2014). This observation could be extended to PAs in economically developed nations, including the U.S. (Andersen, 2008).

VI. Administrative and Implementation Systems

That both the United States and China have established areas for the purpose of protecting threatened and endangered species, populations and ecosystems is an important indication of commonality in their behaviors. More important to the work of protection and preservation, however, is the system and practice of administration and implementation. Here, there are three areas of difference.

First is the architecture of the administrative system, specifically the number and missions of agencies involved in preservation work. While both countries have a similarly diverse range of agencies with authority and practice of involvement in environmental policy and its implementation; with regard to rare, threatened and endangered species, the United States has

a more focused system. Only two agencies—the USFWS and NMFS (the first an agency of the U.S. Department of the Interior and the second of the U.S. Department of Commerce)—have recognized authority in preservation work. These two departments have primary authority in the regulation of biodiversity conservation work in national parks, forest reserves, monuments and refuges.

In the case of China, multiple agencies are involved in both species protection and management of national parks, forest, and reserves. The Ministry of Environmental Protection (MEP), as a late entrant to environmental management, shares authority with the State Forestry Administration (SFA), which is in charge of three-fourths of PAs, and also with the ministries of agriculture, water conservation, land resources, oceanic administration, construction and geology and mineral resources (Xie et al., 2004). This, along with the relatively weak MEP, gives not only the older powerful agencies, such as agriculture and land resources, but also the state's significant planning agency (the National Resource and Development Commission [NRDC]) opportunities to elevate their own interests (and powerful connections) to prime status.

Second is an important difference in the relationship of the national government with sub-national units of the country. Constitutionally, the United States is a federal system while the People's Republic of China is a unitary state. The nature of the U.S. system, called federalism, is that sub-national units retain semi-sovereign powers; in the area of environmental protection, this means that states may develop their own laws and regulations, so long as these do not weaken requirements of federal rules.

Although China is a unitary state, with no obstacles between drivers of the Beijing government and outcomes in provinces, municipalities and counties, most experts call it a

decentralized (some even calling it a “quasi-federal”) system (Lieberthal, 1995; Saich, 2004). Particularly since the onset of economic reforms, implementation powers have devolved to provincial and local governments. For example, each of the provinces has a forestry bureau, and environmental protection offices are at the local governmental level too. In theory, the subnational offices serve two masters, the national ministry (MEP or SFA in relevant cases) and provincial governors or mayors. Yet increasingly funding comes from provincial and local levels, which also are empowered to make recommendations for promotion of cadres. This explains the failure, until recently, of local environmental authorities to repair obvious damages to ecosystems (Campbell, 1997). Notwithstanding ample evidence of decentralization in China today (Hillman, 2014), the “autonomy” found at the provincial, municipal and county level cannot be ensured into the future.

Third, although both systems have “command-and-control” features of the modern bureaucratic and regulatory state, the U.S. has vigorous grassroots actors and activities, constituting one of the world’s most robust “civil societies,” while China has few and generally weak buffers between the state and the citizenry. One area of emphasis is the role the public may play in review of environmental changes. Since the 1969 enactment of NEPA, citizen groups in the U.S. have had the opportunity to actively participate in review of environmental-impact-statements (EIS), to testify at public hearings and have their views considered by agencies with decision-making powers. Since that time, the federal courts have strengthened this role, requiring under the Administrative Procedures Act (APA) of 1946 that agencies respond to (and take into account) all public comments. Of course the major guarantor of civil society in the U.S. is the First Amendment to the U.S. Constitution, which acknowledges the right to free speech and the right to “petition the government to address grievances.”

No such rights, defended by a strong judiciary, are available to Chinese citizens in 2016. Definitely, the opportunities for grassroots activity (including protests to address environmental wrongs [O'Brien and Li, 2006]) have improved substantially in the last decades. The NGO community today is much larger than it has ever been, and environmental NGOs benefit from championing causes that would be difficult for any state to object to. Yet NGOs remain severely constrained by requirements of the state, limiting their ability to operate freely throughout China, to raise money to support their causes, and to advocate against the government when interests conflict. Thus notwithstanding the improvements in public participation (Moorman & Ge, 2007), China's system allows considerably less latitude to NGOs. Our judgement, unlike that of some authorities (e.g., Shapiro, 2016), is that while there is some convergence of the U.S. and Chinese system, they seem likely to remain separate and distinct for the future (Grumbine & Xu, 2011; Yang & Deng, 2013).

VII. Comparative Evaluations

China and the United States together have a large number and percentage of the world's rare, precious and endangered species. The approaches they take to preservation of these species, populations and ecosystems are dissimilar. This is the consequence of quite different historical trajectories, cultural, social, economic and political systems. Here we point out some of the strengths and weaknesses of the approaches, with regard to the species under consideration.

The United States follows a law-based approach to endangered species protection, and this implies, given a separation of power system that features an independent judiciary, that the courts and their judges are active participants. On several occasions, U.S. courts (spanning from the district to the supreme court) have opined that only **the protection of** the endangered species

is at issue. Other considerations and in particular economic ones (such as the estimated value of the alternative usage of part of the critical habitat region) cannot be considered. In rare moments of contentious conflict between federal agencies charged with species protection and opposing forces seeking to exploit natural resources (such as the conflict between NMFS and the Seattle-based North Pacific bottom fishery), Congress has suspended the ESA to avoid implementation of a court injunction (McBeath, 2004).

In the American system, species (and on occasion populations) are protected; however, the law does not provide for the protection of ecosystems, except insofar as they constitute part of the species' critical habitat. Other limitations of the U.S. system include the lack of a prioritization scheme regarding the evaluation of species. All species listed are presumed to be of equal value, except that mega-charismatic species (most of which are mammals, such as wolves and polar bears) are of higher priority than plants, because of popular pressure in their defense. Of the nearly 2,000 species in the U.S. listed as threatened or endangered, just 1 percent have become extinct, and that is a very important sign of the efficacy of ESA. Species recovery is more difficult to measure, as biologists typically comment that a period of at least a generation is needed to assess sustainability of species (Scott et al., 2016). Nonetheless, during the 43-year period in which the ESA has been in effect, species recovery has exceeded 90 percent (*Scientific American*, 2014).

The approach taken by China can be described as relational; it focuses on agencies, and as we have noted, multiple agencies have been involved in the work of biodiversity conservation, and their objectives often conflict and may be contradictory (Zheng & Cao, 2015). Too, statutes, the Chinese constitution, and actual behavior accord attention to the right of the people to the natural resources of the system, and these include wildlife. Decentralization efforts in the last

generation express more of a pragmatic orientation than in the early years of the People's Republic. Yet our survey of the literature reveals only limited information on the efficacy of law and policy regarding species preservation.

China is a developing country and shares with many other developing countries the problem called an "implementation deficit"—difficulties in putting the law or regulation into effect. Unlike other developing countries, China is a party-state whose leaders strive to ensure that crises will not endanger or enrage the public. In recent years, Chinese leaders have changed the cadre evaluation system to include environmental problems. In the view of those who have studied the *nomenklatura* system, this may increase both the uniformity and effectiveness of the implementation and enforcement regime (Wang, 2013)

Conclusion

Although China and the U.S. are similar in territorial size and environmental footprint, they have different political, legal, economic and social systems. These differences have led to contrasting approaches to biodiversity conservation, and this is what we would expect. Law-based approaches such as that used in the U.S. have significant strengths, as attested to by the fact that they have preserved many endangered species. Among the weaknesses of this approach is the great cost of species preservation work (Platt, 2013), which certainly does not recommend it to developing nations.

Often contradictory, agency-based approaches such as that used in China are complex and put a greater emphasis on political relationships (and their personal dimensions) of government agencies, and less of an emphasis on science and its demands for uniformity in assessment of species, their critical habitats and ecosystems. However, the Chinese system is

evolving, and individual scientists have played prominent roles in identification of problems and development of coalitions (including outreach to foreign experts and NGOs). Recent leaders have paid more attention in their policy pronouncements to environmental concerns and seem willing to allocate more funding to biodiversity conservation efforts, including stricter scrutiny of the environmental work of government personnel. There are grounds for hope in the progressive evolution of the Chinese system.

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