TOWARDS SUSTAINABLE COMMUNITIES:
ENVIRONMENTAL AND RESOURCE MANAGEMENT IN LIJIANG CHINA

by

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Abstract

Sustainability—designing and containing human activities and processes within nature's capacity and processes—is a serious challenge facing environmental and natural resource management institutions in the 1990s. This research project examines and evaluates sustainability in its complexity within an institutional, socio-economic, and technological context through a case study of environmental and natural resource management in Lijiang, a traditional community in southwest China.

Extensive documentary and field research for this project was conducted between 1992 and 1998. The project focuses on forestry, agriculture, tourism, hydroelectric power, and environmental protection, as these are key sectors that drive social, economic, and environmental activities and trends in Lijiang. Research findings show a dichotomy between high-level environmental sensitivity and responsible resource uses among traditional communities through community-based, self-regulatory, and self-sufficient systems on the one hand and institutional trends driven by reductionist economic reasoning that excludes social and environmental concerns on the other.

How this dichotomy develops will dictate future sustainable prospects in Lijiang. Although national political, legislative, and institutional contexts and international economic conditions will have considerable influence, Lijiang has basic building blocks for sustainable options. To realize these options requires institutional redesign according to sustainable principles, promotion of community-based systems that nurture biodiversity and cultural diversity, and regional planning that integrates local wisdom and ecosystem management principles.

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Introduction

I spent a good part of my time in the last seven years working on an international development project in Lijiang, a small, remote ethnic minority community in southwest China. Indeed, my research agenda, first of organizational communication, and lately of environmental and resource management, was partly influenced by my involvement in the Lijiang Project and my desire to assist Lijiang people in their search for meaningful development alternatives. When it was time to choose my research project topic, I knew that I would like to do a case study in Lijiang.

The other factor that drives my research project has to do with my training in two graduate programs which are rooted in two very different paradigms. The School of Environmental and Resource Management represents the cutting edge in rethinking about the environmental and resource implication of human activities. Another academic interest from my training in the School of Communications, however, critically examines the concept and practice of development as a destructive and homogenizing process. Superficially, these two paradigms may appear to be as complementary as fire and water. Refusing to follow a linear reductionist choice of one over the other, I am determined to negotiate and combine the best from each in my research project. If I am attracted to both programs for the same reason of problem solving, intellectual enlightenment and social commitment, and am inspired each time, I should be able to manifest this process through a case study.

If the decision to write my research project as a case study in Lijiang came easily, choosing a research question of most relevance and urgency to Lijiang turned out to be a challenge. In many ways, Lijiang typifies ethnic minority communities in the area. Despite centuries of contact, trade, conquest, and colonization, Lijiang is still very much a traditional community. However, with the economic reform policy in the late 1980s, and the opening of the first ever commercial airport in 1994, Lijiang has entered a transitional period when

development projects and capital are being aggressively pursued and a dramatic economic growth planned.

As is common throughout the world, there is much about this development process that has been problematic. There has been social dislocation, inadequate incorporation of social and environmental concerns into the economic decision-making process, no institutionalized public participation, and a general lack of environmental review and impact analysis, despite emerging problems of pollution and environmental degradation. Important issues and problems are many. After weighing different options, I decided to focus on the question of whether the environmental and resource management regime in Lijiang is sustainable or can be said to be moving towards a sustainable model.

The methodology that guided my literature and field research necessarily reflects the two paradigms of sustainable resource management and critique of communication in development. Acknowledging that it is not possible to catalogue all my intellectual sources, the following lists the major ones. The first analytical framework for my research has to be that of sustainable development. Apparently, this is a difficult choice, given my intention to situate my study within a larger critique of development. I have three rationales. The first is that the two paradigms share the view that the current economic practice based on a model of unlimited growth is unsustainable. Whereas they might differ in causes and remedies, the starting point is the same. Secondly, no social and economic processes, homogenizing or otherwise, can be said to be intrinsic to sustainable development as either a concept or a practice. The critical analysis of sustainable development mainly arises from its association with a problematic development paradigm, in particular, when what is to be sustained turns out to be economic growth at almost any cost. This association is not assumed in my research project. Finally, sustainable development epitomizes some of the most progressive thinking and principles in the environmental and resource management field. As such, it provides a firm shared anchor for analysis.

If subscribing to a sustainable development framework is difficult, defining it is equally so. Acknowledging that theoretical discussions of different sustainable development concepts are not the subject of this research project, basic parameters have to be clarified before any sustainability analysis can proceed. For the purposes of this study, I have assumed that an environmental and resource management model is sustainable if it satisfies the following criteria:

- Environmental, social, and economic sustainability are interrelated and interdependent. The achievement of one is not possible without the achievement of others.
- Environmental and social concerns have to be explicitly integrated into the economic planning and management process.
- Public participation and access to information are essential to ensure project, planning, and policy sensitivity to local needs, balance between economic, social and environmental concerns, and acceptability to local communities.
- Any use of renewable resources has to be conducted in a manner that is not detrimental to the regeneration of the resource base and its future use.
- Human activities have to be managed within the natural capacity of environment.
- The trend of centralization, specialization, and compartmentalization among resource management institutions has to be reversed, and their integration and cooperation encouraged.

An environmental and resource management regime can be described as moving towards sustainability if it is creating the necessary social, economic, and institutional infrastructure within which the satisfaction of the above criteria is encouraged.[1]

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[1]There is much writing on sustainable development, ranging from philosophical to technical. Introductory discussions of the subject include World Commission on Environment and Development *Our Common Future* (1987) and Mathis Wackernagel *Our Ecological Footprint* (1996).

The second analytical framework that informed this study is that of integrated regional planning, which is a large category under which a wide range of topics and materials could be assembled. Examples include public participation, environmental planning, harmonization of human processes with natural processes, policy analysis, impact analysis and bioregional principles.[2]

Knowledge systems constitutes the third framework. It loosely describes a school of studies whose primary concern is the interaction between modern scientifically based and locally based indigenous knowledge systems and in processes of intervention to achieve development. This framework critically examines the globalization of development discourse as a destructive and homogenizing force, mediated through markets and the transfer of modern science and technology. Viewing the development discourse and the practices it rationalizes from a macro, historical perspective, the knowledge system framework provides a critical context within which fundamental assumptions underlining the development discourse are analyzed and challenged.[3]

After extensive documentary research, I conducted intensive field work in December 1995. Over three weeks from December 3 to 23, I visited many sites, collected much primary data, and interviewed more than twenty officials, engineers, managers, and technicians from nine environmental and resource management agencies in Lijiang. A second field trip was made in February 1998. To maximize the results from this short five-day stay, I also researched the local newspaper *Lijiang Daily* dating from January 1997 till February 1998.

Although these two field trips provided opportunities for focused research for my research project, the scope of my research extended beyond them. My analysis draws upon

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[2]Some watershed readings in this field are John Friedmann *Planning Public Domain* (1987), Ian McHarg *Design with Nature* (1971), and Daniel Botkin *Discordant Harmonies* (1990).

[3]Wolfgang Sachs (ed) *The Development Dictionary* (1992), Vandana Shiva *Staying Alive* (1991), and Robert Chambers *Rural Development: Putting the Last First* (1983) provide solid introductions to the field.

findings from the six visits I made to Lijiang between 1992 and 1998. Covering many villages in different parts of Lijiang, the information I gained from these trips went beyond data collection and provided invaluable insights and context for my research project.

As extensive as my research is, it does not attempt to cover all environmental and resource management related sectors in Lijiang or its natural and social heritage inventory as such. The study is selective, and only key processes and key players are analyzed. Besides the apparent constraint of time and space, the choices were strategic in the sense that they were intended to bring into sharp focus the interaction of social, economic, and environmental forces, and how these interactions have and are evolving.

The research project opens with an introduction to the people, biophysical landscape, and institutional context in Lijiang. Following the introduction is a chapter on forestry, arguably the most important resource sector in Lijiang because of its contribution to the local revenue and its status as one of the most significant local natural resources. Next we examine agriculture. Transition or no transition, Lijiang has been and still is overwhelmingly agricultural. The chapter on hydroelectric power and tourism is included for a very different reason. With the hydroelectric power projects being considered by the national plan and tourism funded by the provincial plan, they are more about where Lijiang hopes to be than where it is now. As such, the plans and projects have enormous social, economic, and environmental sustainability implications. The last chapter is devoted to environmental protection and management. With a staff of three and an extremely limited mandate, the Lijiang Bureau of Environmental Protection can hardly qualify as important within the Lijiang institutional context. Nonetheless, it is crucial to the discussion of sustainable development and options.

The research project is not narrowly focused on the environmental and resource management regime as such. Instead, I try to provide a road map through some very complex social, economic, and environmental interactions while situating the discussion within the

wider historical and socio-economic context that gives these interactions their particular character.

I hope that this research project contributes to the body of literature on sustainable development, regional environmental and resource planning and management, and the role of local knowledge systems. Most importantly, it should be relevant to Lijiang's people in their search for sustainable development alternatives.

Chapter I

Lijiang: the natural, human, and institutional profile of a community

With twenty-four officially recognized minority groups, Lijiang exemplifies the cultural diversity of Yunnan Province. The Naxi form the local majority, hence the official title of Lijiang Naxi Autonomous County. Lijiang has a total population of 334,882, among which 59% or 197,688 are Naxi, with Han, Bai, Lisu, Pumi, Miao, and Tibetan forming the other 41%. Lijiang has 24 townships and 152 administrative villages which are formed of 1212 natural villages.[4] Situated between the dramatic drop from the Tibetan Plateau to the Yunnan Basin below, 95% of Lijiang's topography is mountains (Lijiang Prefectural Government Office, 1997, 265-280).

At the center of Lijiang is Dayan Town. Established in the Southern Song Dynasty (1127-1271), expanded in the late Yuan Dynasty (1271-1368) and declared a UNESCO World Cultural Heritage Site in December 1997, Dayan is an ancient Naxi settlement with exquisite wood frame houses and quarried stone streets (Figure1).

The Naxi settled in Lijiang some 2000 years ago. Nature is generous to the Naxi. The biophysical landscape is as giving as it is stunningly beautiful. The way Naxi people live and relate to the environment clearly indicates a mature culture at peace with its natural environment. This little Shangri-la, however, is not immune from economic development and modernization. As China pushes economic reform, change appears inevitable. This chapter is devoted to a description of the human and natural landscape in Lijiang as well as institutional forces that aim to change them.

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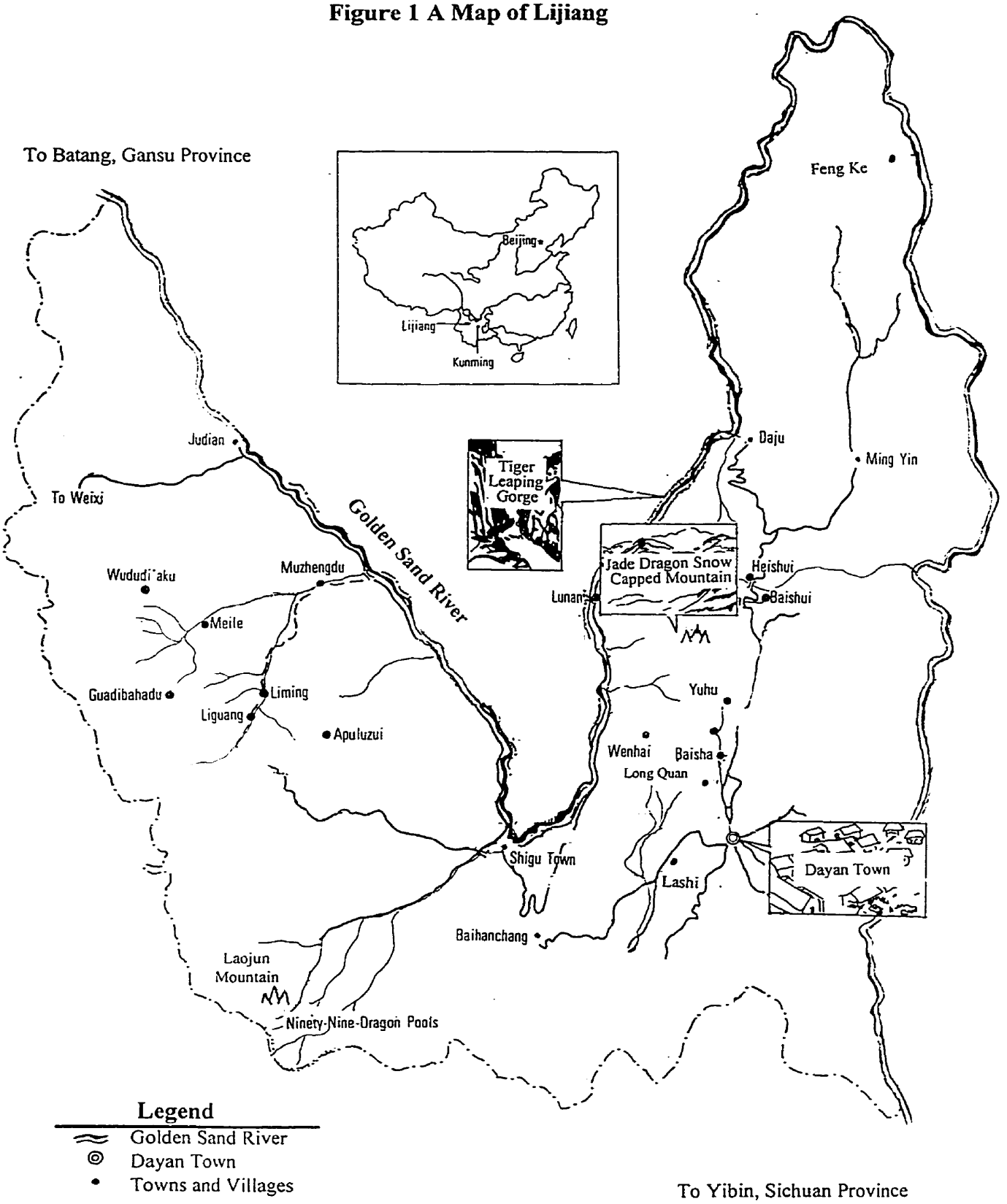
[4]Townships, administrative villages, and natural villages by and large correspond to the former boundaries of communes, brigades, and production teams in Lijiang. The administrative structure was transformed in the early 1980s in an effort to separate economic management from government.

Figure 1 A Map of Lijiang



The natural and human landscape

Two natural features dominate and define the natural landscape in Lijiang: the Golden Sand River and the Jade Dragon Snow-Capped Mountain (Figure1). The Golden Sand forms the upper Yangtze River. Originating in Qinghai Province in the northwest, the Golden Sand River runs 2308 kilometers from the Batang in Gansu Province to Yibin in Sichuan Province. For 447 kilometers the Golden Sand hugs Lijiang and forms the border between Lijiang and Zhongdian, Ninglang and Yongsheng Counties. According to the local flow record, the annual average flow measures 41.92 billion cubic meters. The highest flow was recorded on August 1, 1972 at 7550 cubic meters per second, and the lowest on January 30, 1960 at 310 cubic meters per second. The fluctuation in water flow corresponds with the local precipitation pattern in which 80% of the 959 millimeters annual average rainfall occurs between July and August.

Golden Sand River is important to Lijiang not simply because of its impressive length and flow. With 21 major tributaries flowing into the Golden Sand, its drainage covers 7016.6 square kilometers or 94% of Lijiang's total territory of 7492.41 square kilometers. Three tributaries drain into the Mekong River through the Lang Cang River. It is therefore no exaggeration to say that the Golden Sand drainage system to a large extent sets the pattern for human, vegetation, and wildlife distribution.

If the Golden Sand forms the border and lifeline, the Jade Dragon Snow-Capped Mountain is the physical and spiritual highlight of the land. Considered sacred by locals, the Jade Dragon Snow-Capped Mountain consists of thirteen peaks with the highest, the Jade Dragon Peak, at 5596 meters above sea level. The snow line forms at around 5000 meters and there are 22.5 square kilometers of glacier surface. While the Jade Dragon Snow-Capped Mountain is the highest and the most sacred, it also typifies a landscape of soaring peaks with rivers carving deeply into the valley (Table 1).

Table 1 Landscape Analysis: Mountain Height and Area Size

Landscape	Height, meters	Area size, km²	% of total
Narrow valley bottom	1500	55.3	0.75
Wide valley bottom	1500-2000	483.6	6.51
Medium peak	2000-3000	5280.6	71.12
High peak	3200-4200	1504.3	20.26
Extremely high peak	above 4200	101.2	1.36

Source: Lijiang Bureau of Water and Electric Power, 1985, 1.

A further feature of the biophysical landscape, crucial to understanding the human settlement pattern and Naxi's way of life, are the numerous natural springs, typically found at the foot of the mountains where they connect with the perimeters of valley bottoms. With the Golden Sand and the 21 major tributaries feeding into it, Lijiang is not short of water. According to records, the annual rainfall in a rainy year could be as much as 1213.3 mm (1963). However, it falls mostly during the monsoon season, and the difference between seasonal highs and lows are dramatic. The total precipitation from year to year can also vary greatly. In a dry year, it could be as low as 648 mm (1983), almost half of 1963. The physical landscape of deep valleys and steep mountain sides also means that the river water is often difficult to reach. By comparison, springs are stable sources of water, which are easily accessed and channeled. It is estimated that Lijiang has 106 permanent springs with an overall flow of 11.66 cubic meters per second (Lijiang Bureau of Water and Hydroelectric Power,1985, 3-4). There are 26 springs on the perimeters of the Lijiang Basin area—where is also the greatest concentration of population in Lijiang.

Together, these natural features to a large extent dictate the local ecology in Lijiang. First of all, the highly varied landscape provides a variety of microclimates. The average

drop between mountain peaks and valley bottoms is 1000-2000 meters while the most dramatic is a tremendous drop of 4000 meters from the Jade Dragon Peak down to the Tiger Leaping Gorge on the Golden Sand River.

At and under 1500 meters, the climate is typically subtropical with an average annual temperature around 17.5° to 18°C (Table 2). The climate is mild with monthly average ranging from 11° to 22°C. Frost is limited to about 100 days. Annual rainfall is around 600-800 mm. Such elevation and climate is typically found along the Golden Sand River valley. As the following table shows, the climate changes dramatically as one moves up from the Golden Sand River valley.

Table 2 Landscape Analysis: Correspondence between Elevation and Climate Type

Height, meters above sea level	Temperature, annual °C	Temperature, monthly high	Temperature, monthly low	Frost, days	Rainfall, mm
1500 and less	17.5 - 18	22	11	100	600-800
1500-2000	14.5 - 15.5	19.9	6.5	110	600-800
2000-2500	11.3 - 12.3	18	3.9	160	900-1000
2500-3200	8.0 - 9.5	15.7	1.4	200	900-1200
3200-4200	3.5	10.7	-4.2	-	-
above 4200	-	-	-	frozen	-

Source: Lijiang Weather and Climate Station, 1985, 3.

It is not surprising that these varied biophysical landscapes and microclimates, combined with plenty of water, support an abundance of vegetation and forests. According to statistics, forest coverage in Lijiang remained as high as 70% until the Great Leap Forward Movement in the 1960s, when the national priority of iron and steel production dictated

cutting down trees to fuel local furnaces. The second wave of destruction, ironically, came with the economic reform in the 1980s when a combination of community and household control of forests, and lack of certainty about policy changes, led to short-term behaviors. Nonetheless, Lijiang still has an impressive forest resource with the current coverage around 40%. Plant species are highly diversified, ranging from tropical desert plants along the bottom of the Golden Sand River valley to the exotic snow lily found between 4000 - 4500 meters above sea level. Some tree species that dominate the productive zone around 2500 meters, such as the Yunnan Pine, are nationally famous.[5]

Vegetation and forests, in turn, provide a variety of habitat for wildlife. Although Lijiang is well settled, and few watersheds are completely without human presence, it still supports hundreds of animal species, large and small. Mountain goats mostly live above 4000 meters along the upper Golden Sand among exposed rocks. The lesser panda bear can be found in the montane zone on the Jade Dragon Snow-Capped Mountain where bamboo grows side-by-side with other species. Forests around 2000-2500 meters above sea level provide the ideal habitat for deer, monkeys, black bear, and other species. Colorful pheasants are a common sight in meadows and bush areas. Cougars and wild cats are far more rare, each requiring a large territory and usually at high elevation. Birds of all kinds find suitable habitats on forest edges around meadows. Many have exotic crowns and long tails, giving Lijiang the potential to become a bird watchers' paradise. Lijiang also boasts a large variety of butterflies, some extremely rare (Lijiang Bureau of Forests, 1985, 29-32).

The human landscape is very much in tune with the natural landscape, reflecting a traditional lifestyle well adapted to the local environment. A human settlement map jointly produced by Lijiang line agencies and the Chinese Academy of Sciences shows a pattern of small communities and villages concentrated in river valleys and small basins. The settlements are well distributed throughout Lijiang with the exception of the Lijiang Basin.

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[5]According to an inventory survey conducted in 1984, meadows among forests support 64 families of 497 vegetation species (Lijiang Bureau of Animal Husbandry, 1984).

At 168.57 square kilometers, it is by far the largest in Lijiang, supporting the historical Dayan Town and surrounding villages.

Traditional human settlement in Lijiang follows a recognizable pattern. The best arable lands in the valley and basin are devoted to agriculture. Farming is mostly traditional. Cultivation is mostly organic and manual with the help of domestic animals. Villages, which are mostly connected by trails or unpaved narrow roads, cluster along the base of mountains. Horse carts, bicycles, or walking provide the most popular means of transportation. Village life is largely self-sufficient and self-contained with families raising animals, vegetables, and fruits around houses. Springs play a central role in village life, providing reliable pristine sources of water and places for socialization. Water use in villages, self-regulatory by tradition, is typified by the time share and three-well system. Spring water is channeled into three physically separated wells, each is used for a different purpose: drinking water, washing vegetables, and washing clothes. This is supplemented by rules regarding the appropriate time for each activity, reconciling potential conflicts between users while respecting the flow and carrying capacity of the stream. Other water sources, typified by small wetlands with their microecology of fish and plants, are protected, again mostly by tradition and self-regulation (He Wanbao 1988, 165-166).

Yang Fuquan, a renowned Naxi cultural scholar, described the process through which community regulations are generated and implemented.

> Each village selects its most respected elders with the highest moral standards when organizing the Elders Committee (Zhang Lao Hui). The Elders Committee develops, promotes, and reinforces community regulations for protection of mountains, forests, and water sources. . . . Elections are conducted every three years. Elections are typically held during the Bonfire Festival season of June (lunar calender). All villagers participate in the event. Normally, eight to ten elders are elected. . . . The Elders Committee is responsible for compiling community regulations, revising the regulations, and mediating conflicts. The Elders Committee also appoints villagers to look after mountains, lands, and other common resources. Villagers engaging in activities in violation of the regulations are disciplined by the Elders Committee. (1997a, 2)

Unlike some parts of China where hillsides are heavily terraced and cultivated, hillsides in Lijiang are mostly protected except for occasional temples. This, of course, is crucial in protecting the fragile ecological balance, since Lijiang is typified by steep mountain sides and valleys (Table 3).[6]

Table 3 Land Slope Analysis

Land Slope	Percentage of Total Land Area
Flat, less than 5°	6
Gentle Slope, 5°-15° Moderate Slope, 15°- 25°	44
Steep Slope, 25°- 36° Extremely Steep Slope, more than 36°	50

Source: Lijiang Research Institute of Agricultural Machinery, 1985, 5.

Leaving hillsides undisturbed also protects the quality and quantity of spring water. The value of this practice is all the more evident when compared to places where the tradition is no longer respected. Elephant Hill on the edge of Dayan Town, for example, forms the immediate drainage area for the Black Dragon Spring, which feeds into the Black Dragon Lake, the only source of drinking water for Dayan until 1997. Black Dragon Lake has dried up several times since Elephant Hill was logged in the 1960s and converted into a "park," complete with stairs and pagodas.[7]

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[6]While hillside protection is practiced by the Naxi, there is a distinctive upland culture of marginalized minority groups who are historically pushed out of the fertile basin areas. To understand these small, marginalized groups and their relations to the environment, more studies will be necessary.

[7]Labeled as superstitious, and primitive, traditional self-regulatory systems have been under enormous destructive pressure to change. While communities' resistence and survival of traditional self-regulatory systems are evident in many places, Dayan has suffered the most damage because of its proximity to the

In 1996, there were 80,272 households in Lijiang county. Of these, 63,503 or 79% engaged in agricultural activities. The total agricultural output value was ¥259.74 million (C$43.29 million), considerably higher than the ¥182.81 million (C$30.47 million) industrial output. The agricultural household and agricultural output values confirm that agriculture forms the basis of the local economy. However, a trend towards industrialization, however slow it may be, is evident when the numbers are compared with 1980 values when the output for agriculture and industry were ¥37.49 (C$6.25) and ¥14.7 million (C$2.45 million) respectively. While the growth factor is difficult to gage because 1990 is used as the basis of accounting, and no inflation is taken into account prior to 1990, it is apparent that industrial output value has been growing faster proportional to agricultural output value.

With 64 enterprises, the national, provincial and county government-owned industry is limited, concentrated in pulp, paper, timber processing, textile, leather processing, and construction materials. By comparison, the township enterprises, the lowest level local government ownership, is thriving and quickly becoming the backbone of the local market economy. In Lijiang, 11,487 township enterprises employ 21,314 employees. This is in sharp contrast to the 1984 total of 466 township enterprises with 4587 employees. Small in scale, close to communities and labor intensive, they engage in everything from fish farming, orchards, animal husbandry, transportation, and construction to manufacturing, wholesale, retail, food production, and other services.

Our analysis of the natural and human landscape in Lijiang clearly indicates an agricultural and self-sufficient traditional community well adapted to its natural environment. Industrial enterprises are mostly small, limited in numbers and labor intensive. Over centuries, the Naxi have found a way to live a life of relative abundance in harmony with their delicate natural environment. Change, however, is already evident. As much of the pressure for change comes from outside, an examination of the institutional landscape is

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administrative and political power center of Lijiang.

crucial to understanding how the national economic reform policy is impacting local decisions and processes.

The Institutional landscape

Three national factors, often lumped together as "the economic reform," set the stage upon which the local institutional landscape is constructed. First of these factors is a transition from a centrally planned and controlled economy to a so-called centrally guided economy where local governments are given more management responsibilities and encouraged to plan and finance their own projects within a larger context of central government policies and legal constraints that influence local decisions. Factor two is a shift from bureaucratic power to technocratic power. Last, but not least, is experimentation with market regulating supply and demand. We will consider each of these factors within the Lijiang context and analyze how they are shaping the local institutional process.

When asked about the major difference between the planning processes before and after economic reform, Hong Jianxin, vice-director of the Lijiang Planning Commission, described it as decentralization and local control. According to Hong, most of the local revenue used to go all the way up to the central government who would then distribute it back to local governments with each yuan earmarked according to national plans. Since economic reform, national policy has changed from command planning to guidance planning. The idea is to retain a proportion of tax and revenue at the local level to give local governments much more room to manoeuver while requiring them to plan and finance their own projects. Both incentives and disincentives are created where local governments are allowed to retain a progressively larger percentage of budget surplus and penalized for consecutive budget deficits. This transition has been hugely successful, at least in economic terms, among some of the coastal provinces and cities that are quickly emerging as independent powers. By contrast, Lijiang and other economically challenged regions have been historically on the receiving end of national government transfer payments. With yet

another budget short fall in 1995 at ¥42 million, the transition for Lijiang has been a hard one indeed.[8]

Local control is meant to stimulate local initiatives, generate more efficient and financially accountable means of meeting local needs, and ultimately liberate communities from the dictatorship of provincial and national plans. The irony is that Lijiang is now more dependent on the provincial and national agendas than ever. Each provincial and national five-year plan identifies certain priority projects to be funded under the plan. In Lijiang, much emphasis is placed on getting into provincial and national plans, with little attention paid to social and environmental impacts. The two so-called "fist" projects—tourism and hydroelectric power—which are supposed to propel Lijiang into the 21st century, are both conceived by Lijiang government officials and planners as niches within provincial and national plans.

Inadequate control over the local agenda and a narrow focus on economic rationale aside, another impact of limited local financial capacity and narrow focus on revenue generating activities is the reduction of nonessential services, a category that often includes environmental functions. Yang Tielong graduated from Yunnan Medical School in 1976 and has since worked for the Lijiang Disease Prevention Station, the only urban water quality testing facility in Lijiang. He became the director in 1994. In an interview in 1996, Yang explained that they used to test 14 of the 23 nationally required indicators up until 1991 when they had to cut back to six because they could no longer afford to purchase the necessary testing reagents.

The rationale behind the shift from political bureaucratic to technocratic power is to replace the old arbitrary decision making with scientific rigor. While there has been bitter resistence from established bureaucrats from the very beginning, a generation of younger, well educated leaders are now firmly in positions of authority. This is quite evident in

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[8]Although interviewees confirm that Lijiang has been running budget deficits, historical statistics are very difficult to obtain.

Lijiang. One thing that has not changed, however, is the hierarchical nature of the institutional process.

By interviewing workers and cadres who left China in the 1970s, Andrew Walder constructed a theory of organized dependency, a powerful framework for analyzing decision-making processes in the Chinese workplace. According to Walder, the Chinese institutional process was characterized by a system of personalized hierarchical power. This system was reenforced through workers' dependency on their enterprises and leaders for their basic needs, a statement which was and is true of Chinese institutions of all kinds beyond just factories and enterprises. This dependency relation, in turn, deprived workers of their ability to organize and defend their interests (Walder 1986).

While some conditions Walder described, such as the enterprise as the exclusive source to meet workers' basic needs, have since significantly changed, structures of personalized hierarchical authority continue to shape Chinese institutional processes. Although a particular leader may choose to do otherwise, there is little institutionalized participation, few checks and balances, appeals, representation, or recall mechanisms.

Because the system is personalized, it is often extremely difficult to generalize. While development decisions in Lijiang often reveal insensitivity and arbitrariness, some leaders involved in specific decisions are also capable of the opposite. One such example involved the construction of the second drinking water plant at Baisha to supply Dayan Town (Figure1).

Started in 1985, the completion of the plant took ten years of negotiation with farmers in Baisha. Two rivers that supplied the second plant, Sansi River and Seven Dragons River, also irrigated some 80,000 mu[9] of farmland in Baisha. The Bureau of Urban Planning and Construction, which was responsible for the project, felt the impact would be minimal because the majority of the 80,000 mu involved were semidesert and not very productive.

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[9]One hectare equals 15 mu; one mu equals one-sixth of an acre.

They calculated that the impact could be mitigated by reallocating water to more productive lands. Baisha farmers did not know anything about the project until construction materials started to arrive on site. Horrified by how large the pipes appeared to be, farmers were convinced that the project would lead to disaster. What followed was a genuine dialogue and negotiation, which led to significant changes to the original plan to accommodate local conservation, agricultural, compensation, and other concerns.

While the above example is by no means unique in either Lijiang or China, democratic participation is practiced at the discretion of wise leaders. Li Qidong, a lawyer and economist working for Ximeng Consultants for Cooperative Economy pointed out the crucial difference between what he called "democratic management" and "managerial democracy."

> Managerial democracy goes beyond demanding or asking employees to participate in management and returns the entire right to manage to its rightful masters. The masters will then exercise their right according to an agreed process. History has given us the mistaken impression that democratic management is driven by leaders. It is up to the leaders to promote democracy and exercise a democratic style of management. This perception needs to be reversed. Democratic management should be driven by workers. Leaders, such as directors and executives, are merely serving the workers. (Li Qidong 1996, 2)

Although speaking about democratic management in the workplace, Li's analysis is equally salient in other institutional contexts. Until the example of the second drinking water plant at Baisha becomes an institutionalized, guaranteed, and protected right of participation and self-determination, such examples will remain dependent on the whims of leaders. Li Qidong observed that the question around local control and participation remains largely unanswered despite the recent change from political bureaucratic to technocratic power.

To the Lijiang government, market experimentation often means aggressively pursuing outside investment with what is best described as a frontier capitalist mentality. During the Eighth Five-Year Plan Implementation Conference in 1990, Mu Xiangrong, governor of the Lijiang Prefecture, encouraged government officials to be "audacious" in courting capital investment.

> About capital. The key (planned) projects alone will need more than ¥600 million. Because of the limited financial capability in our region, the majority of the money has to come from outside. This demands that we have to be "audacious" in our pursuit of investment and joint ventures. Without this kind of "audacity," our plans are doomed to fail due to lack of capital. (Mu 1990, 2)

The immediate impact of this policy is that large-scale projects are often rushed through without proper consideration of the need for the project, alternatives, and long-term social and environmental impacts. Within this kind of policy context, local planning is reduced to a systematic brokerage between outside developers and local resources. A perfect example is the designation and development of the Jade Dragon Snow-Capped Mountain Nature Reserve.

The Jade Dragon Snow-Capped Mountain Nature Reserve was established in 1993. According to the local legislation that gave birth to the reserve, the goal was to "enhance the management of the Jade Dragon Snow-Capped Mountain" and "to protect its ecological environment." The legislation sets out a comprehensive list of activities that individuals are not allowed to engage in and the consequences if they do. The second goal, however, is "to rationally develop and use natural resources" on the reserve. Within the larger context of tourism development under the provincial planning priority, the reserve's resource potential is defined as that of tourism development (Lijiang People's Representative Assembly Standing Committee, 1993, 2-3).

Between 1991 and 1993, the reserve was surveyed and potential tourist attractions were catalogued. The report concluded that there were 53 potential attractions waiting to be developed. Some of the development ideas included a cultural village, alpine holiday resort, amusement park, glacier skiing, cable car, and petting zoo. The province contributed funding for the infrastructure such as piped water, electricity, paved roads, sewage, and communication. Development ideas were put out to national and overseas developers. So far, takers have included a three-star hotel, a 958-meter cable car with another 911-meter project being planned, and a zoo. All the investment came from outside, some domestic and some

overseas (Lijiang Prefectural Government Office, 1997, 288-295). The conservation goal of the reserve is to exclude local uses while providing full access to developers and capital investment.

A precondition for any sustainability is systematic integration of social, environmental, and resource concerns into economic planning and decision-making process. If anything, the economic reform has given Lijiang less luxury to consider anything beyond short-term economic goals. Personalized hierarchical institutional processes that exclude local input and participation reinforce this narrow myopic focus.

Summary

The relationship between the natural, human, and institutional landscape in Lijiang is highly interdependent and interactive. The ecology in Lijiang is a rich yet fragile one. A delicate balance between natural processes and human activities has been achieved through centuries of fine tuning an organic, traditional way of life. Key to this balance is the institutional arrangement of self-sufficiency and community-based self-regulation. While this model has always been a dynamic one, Lijiang now more than ever faces accelerated changes that pose a serious threat of potentially irrevocable disruption of the balance.

The question of sustainability has to be examined within this complex and interactive framework. It poses some very large questions regarding human settlement and activities, including institutional processes, and how they impact on the environment. The environment, of course, is never merely something to be impacted. Eventually, it is the natural capacity to sustain and support human activities that will determine their long-term viability. It is within this interactive framework that we move into examination of the environmental and natural resource management regime in Lijiang.

Chapter II

Forestry: between revenue and conservation

It is impossible to avoid the subject of trees and the Lijiang Bureau of Forests regardless of whom you talk to in Lijiang. Residents in Dayan blame deforestation for the increasingly frequent droughts at the Black Dragon Lake. The Economic Planning Commission cannot emphasize enough the Bureau of Forests' contribution to local revenues. Nine Yi villages near the scenic Yunshan Meadow, a central attraction in the Jade Dragon Snow-Capped Mountain Nature Reserve, which is partly managed by the Bureau of Forests, say they would rather die than follow the order to leave the reserve because their alleged environmentally destructive behavior interferes with tourism activities planned for the reserve.

Being pulled in opposite directions by the revenue and conservation objectives, the Bureau of Forests epitomizes the dilemma of eating and keeping the cake at the same time. Caught in between are locals who have been using and managing the forests for generations. When this tension is analyzed within a sustainability framework, many insights could be gained and lessons could be learned from the Lijiang experience.

Forests and forest management in Lijiang

Forestry is of crucial importance to Lijiang for several reasons. First of all, the Bureau of Forests, with more than 300 employees, is the most profitable among the government agencies. Although reliable figures are difficult to collect and methodology for estimations are equally elusive, there is a consensus among staff at the Bureau of Forests and Planning Commission that the bureau's contribution is around 40 to 45% of the total local revenue from all government agencies.

Forests, however, are not merely money makers. The locals depend on forests for various needs from food and shelter to medicine and fuel. Take fuel as an example.

Collecting wood from forests is a necessity as many villages do not have access to electricity and natural gas. Fire is spiritually important to the Naxi and other peoples in Lijiang. Traditionally, cooking takes place in the most prominent part of the house over a hearth made of three polished stones. Whether cooking a meal, entertaining guests, or chatting over roasted sweet potatoes, the fire and stones literally provide the center for family life, and as such they are believed to embody the spirit and blessing of one's ancestors (Yang 1990, 26-54). Many of my interviews were conducted around family fires.

The third factor is the realization that forests will eventually disappear unless harvesting can be maintained within the regeneration capacity, a lesson learned from a dramatic drop of forest cover from 70 to 40%. This realization, however, has its own context. The larger policy catalyst for the conservation objective is the decision to use the spectacular local scenery to attract tourists.

The bureau, therefore has to manage the forest resource within the seemingly contradictory mandate of generating revenue and conservation. According to Qi Xuzhong, a former director of the bureau, the goal is to regain the lost 30% forest cover and return to the historical high of 70%. Given the institutional context of limited local financial capacity and withdrawal of central government financial support, the bureau has to keep contributing significantly to local revenue, at least until alternatives become feasible. The seemingly contradictory goals of conservation and revenue generation are achieved by high and rising timber prices and, more importantly, a conservation policy to support the tourism development priority. This balance of policy and market regulation, however, is a fragile one and difficult to maintain. Any tip in the balance could have significant implications for existing management strategies and practices.

Lijiang Bureau of Forests' response to its dual responsibilities for revenue generation and conservation is a highly intensified management regime based on a regulatory approach. While this highly regulatory regime of intensified management is doing a remarkable job in

achieving its revenue and conservation goals, the bureau's relation to traditional local users of forests is an uneasy one at best.

Lijiang was identified as a major forest production base in the early 1960s. Until 1978 when the Lijiang Bureau of Forests was first established, logging was mostly controlled by the provincial government while the local government was only allowed to use manual tools for felling and transportation of logs. At its peak, the province maintained three forest districts in Lijiang with more than 2000 employees. Together, the three districts are reported to have harvested 1,215,594 cubic meters between 1963 and 1982. Although these statistics are not verifiable, staff working at the bureau suggested that the recorded historical high of 80,000 cubic meters per year was most likely a gross understatement (Table 4).

Table 4 Historical Timber Extraction by Provincial Forest Districts

Name of Forest District	Time line	Total Harvest
Heibaishui Forest District	1967-1982	653,653 cubic meters
Judian Forest District	1978-1982	110,700 cubic meters
Prefectural Forest District	1963-1982	451,241 cubic meters

Source: Lijiang Bureau of Forests, 1985, 15.

Beginning in 1982, control over harvesting was transferred to the Lijiang Bureau of Forests, with the provision that the central and provincial governments have the right to review and change the quota of annual allowable cut (AAC). Currently, the bureau exercises sole responsibility in calculating, planning, allocating, and managing the annual cut.

Forests in Lijiang are divided into state and community owned. With 151,122.1 hectares of state-owned forest and 425,469 community-owned forests, the ratio is roughly 1 to 2.8. The state maintains the underlying title to all the forest, while communities exercise

management responsibilities. However, a community can also contract forest management responsibilities to individuals or households (Table 5).

Table 5 Forest Types and Ownership

Vegetation Category	State Owned, hectares	Community Owned, hectares
Total Land Area	194,963	567,848
Total Forest Area	151,122	425,469
Forest	99,769	275,382
Sparse Forest	19,514	48,119
Shrub	15,776	52,041
Potential Forest	139	0
Tree Nursery	10	0
Barren Lands	15,922	49,943
Nonforest Area	43,641	14,352

Source: Lijiang Bureau of Forests, 1985, 1.

Regardless of whether a forest is owned or managed by the state, communities, or individuals, the bureau manages logging activities by requiring each applicant—individual, communal, or institutional—to draw up a Document Regarding the Technique and Design in Logging Areas (*faqiu gongyi shejishu*) for evaluation. This must contain information on the area, geography, dominant tree species, species composition, age, average height, average diameter, crown coverage, total timber volume, gradient, soil type, soil thickness, logging technique, and projected number of trees to be replanted per hectare. If found satisfactory, the stumpage is calculated, terms and conditions are specified, a contract is signed, and a

logging permit is issued. Evaluation criteria include reforestation targets, protection of riparian zones, soil erosion considerations, and selective logging techniques such as protection of seed trees, trees on a ridge line, and trees smaller than 20 cm in diameters. To achieve its long-term conservation objective, the bureau reduced the AAC below the estimated regeneration capacity. The AAC for 1995, for example, is set at 20,000 cubic meters, well within the estimated annual regeneration capacity of 41,777 cubic meters (Lijiang Bureau of Forests, 1985, 14-23).

The bureau also runs an elaborate reforestation program. A specialized reforestation fund has been established with three main sources of income: government allocation, reforestation fees, and penalties.[10] Implemented in the 1980s, the program involves household responsibility contracts for reforestation. Households and individuals enter into contracts which set out in great detail planting areas, species to be planted, planting techniques, expected survival rate, and penalties for breaching a contract. Payments by the bureau are made in installments with the final one released only after a satisfactory final inspection. With a total reforestation area of 48,000 mu (3,200 hectares) in 1996, the program has been highly successful (Lijiang Prefectural Government Office, 1997, 60).

The legislative basis for the bureau's intensified management regime is the Lijiang Naxi Autonomous County Forest Management Regulation. Forty-nine pages long and divided into 58 clauses, the regulation is one of the most substantial among local regulations (Appendix B). However, the Naxi also have a long tradition of community-based, self-regulated forestry. As we will see, the coexistence of community generated and externally imposed regulations is not always harmonious.

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[10]According to the 1997 *Lijiang Almanac*, the income from penalty payment in 1996 was ¥1.5 million (C$250,000), a significant amount by any standards (Lijiang Prefectural Government Office 1997, 60).

Regulations and local use

Drafted between 1992 and 1993, and approved on 19 March 1993, the Lijiang Naxi Autonomous County Forest Management Regulation governs the entire process of planting, harvesting, purchasing, transportation, processing, and trading of timber and timber products, with a substantial section on violations and penalties. There are two distinctive features about the regulation. The first feature is the heavy handed, penalty-oriented command and control approach to regulation. The second feature is the arbitrary and discretionary interpretation and application of the regulation, often with no provision for appeal (Appendix B).

The penalty provision in the regulation is divided into three categories—economic penalties, administrative penalties and criminal charges—with the most extensive coverage given to economic penalties. Nineteen activities are listed in the economic penalty section with an additional provision to apply economic penalties to destructive activities not covered by the list. Typically, economic penalties are heavy. Other than compensation for economic loss and confiscation of illegal gains, a financial penalty four to six times the illegal gains or economic losses are charged. Records reveal that this policy is being actively implemented. In 1996 alone, nine criminal charges were laid, 813 administrative penalties applied, and 1,018 financial penalties worth of ¥1.5 million (C$250,000) were processed under the regulation (Lijiang Prefectural Government Office 1997, 60).

Such heavy handedness may be justifiable if it is truly necessary to prevent activities detrimental to forest ecology. Unfortunately, this justification cannot be established because almost every illegal activity can be conducted legally when a permit is obtained. Because the language around permit issuing and the penalty application process is ambiguous, determination of what is or is not legal can become extremely arbitrary. While the regulation specifies the process through which administrative and criminal offences are processed, it does not indicate who can or cannot impose financial penalties and under what circumstances. Theoretically, anyone with some kind of delegated forest management

responsibility could do so. There is no provision in the regulation for an affected party to challenge or appeal a financial penalty or even ask for a receipt.

The combined effect of heavy-handed penalties, discretionary application of this mechanism, and arbitrary determination of the legality of activities is to keep locals physically away from forests, and eliminate local uses, while providing full access to outsiders for approved economic activities. Clause 54, provision 2 refers to a ¥500-1000 penalty for each tree taken without a permit. Without any reference to the purpose of taking, age and type of tree involved or cut, and the amount of a tree involved, this provision could essentially eliminate locals' access to forests, regardless of its impact. A similar provision (Clause 54, provision 12) refers to clearing, or taking stones, soil, and other industrial and nonindustrial activities. Again there is no mentioning of scale, amount, purpose, and impact, effectively barring local access to the forest resource.[11]

The underlining assumption behind Lijiang forestry regulation is that local people will behave abusively in pursuit of personal gains unless heavily regulated. Forest management officials in Lijiang are not alone in making this assumption. Garrett Hardin, one of the most famous advocates of an imposed regulatory approach to management of common resources, believed that the only way to avoid destruction of common resources was through some kind of voluntary coercion, or regulation. In a classic example, Hardin (1977) laid out a scenario where local herdsmen would increase the number of animals until a local meadow held in common by a village was destroyed. The assumption was that in pursuit of personal interests, residents with their limited vision could not possibly comprehend the severity of the cumulative impact. Or even if they do, they would not be able to transcend individual interest for the sake of the collective. Thus Hardin concluded that the only way to preserve a common resource and use it responsibly is to regulate.

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[11] A similar struggle over access to resource can be found in India where locals have been using the Neem tree collectively for its unique medicinal property until its economic value was discovered by the market. A patent was granted and local access was severely affected (Shiva and Holla-Bhar 1993).

What Hardin described could certainly happen, and Lijiang is not without local examples. The case of forest destruction at Yuhu is a perfect illustration. In 1983, a landmark year in the history of economic reform, the central government called on the nation to deepen the economic reform through nationwide implementation of the contract system. Lijiang was very much part of the reform. In 1983, control over forests, until then tightly maintained by the provincial government, was divided and distributed to communities. Yuhu, a small community at the foot of Jade Dragon Snow-Capped Mountain range, about 45 kilometers outside Dayan Town, decided to log everything it could for profit. Given the recent historical context of repeated and sudden policy change, Yuhu's decision to take advantage of the policy while it could was understandable and, sadly, not unique.

By contrast, Wenhai, another small community about five-hours hike above Yuhu, made the opposite decision within the same social and economic policy context (Figure1). Wenhai decided as a community to use the opportunity to protect and restore its forests despite incentives and pressures rewarding short-term behaviors. Wenhai's experience brings out an inherent contradiction within the assumption that human nature is necessarily selfish and therefore has to be controlled through regulations to prevent Hardin's "tragedy of the commons." The Naxi have historically used forests for a variety of reasons and sustainably managed this resource using community-based self-regulations. Central to the Naxi's approach to resource management is a respect for nature deeply rooted in their culture and mythology, and central to the Naxi's respect for nature is the legend of Shu and Gu.

Shu represents nature and Gu humanity. Brothers, they lived in harmony until Gu started mistreating his brother by clear cutting mountains and watersheds. Shu retaliated by unleashing droughts, floods, and landslides. Gu acknowledged his mistake. The brothers reached an agreement with four principles. Gu could collect a reasonable amount of wood for fuel and daily use, but not an excess to satisfy greed. Gu could clear some lands for farming, but he must not disrupt water, plants, and wildlife. Gu could harvest a small amount

of wildlife but only when he could not get enough food from domestic animals. And finally, under no circumstances was Gu allowed to contaminate rivers, lakes, springs, and other water sources. With this new agreement, the brothers once again lived in harmony (He 1988, 165-166). Until the late 1940s, the Naxi performed an elaborate three-day ceremony every year, acting out the story of Shu and Gu to remind people about the importance of environmental protection. Although the ceremony may no longer be performed, the teaching from Shu and Gu, however, is still popular throughout Lijiang, especially in Naxi villages distant from the political and administrative center, the county seat, also called Lijiang which has grown up around the ancient town of Dayan.

While the legend of Shu and Gu is a dramatic reminder of the importance of living in harmony with nature, the Naxi's approach to resource management is based on close observation of natural processes over generations. For example, the first day of summer is an important date in the Naxi calender. At this time, harvesting activities, logging, collecting, and hunting are completely stopped, a practice often labeled as superstitious. The ecological basis for this practice, however, is the fact that the first day of summer also symbolizes the beginning of nature's most productive and also most critical period for growth and regeneration (Yang 1997a).

Respect for nature and community rules are an integral part of children's education. Internalized ecological concepts and values provide the basis for self-regulation system in the community. A powerful landlord in Yu Long village at Baisha violated the community regulation about harvesting in the 1950s and thought he could get away with it because of his considerable status and power (Yang 1997a). The villagers collaborated to disallow his domestic animals being raised with those of the village. Herding was highly labor intensive and often involved transhumance in places days' or even weeks' walk away from the village. Traditionally, the villagers took turns performing this duty. When excluded from joining in this activity, the landlord had to repent because he would not have the labor power to raise the animals on his own.

This kind of self-regulatory power within a community was confirmed by an experience of mine. During a field trip in the winter 1994, I was quite surprised to discover large schools of fish swimming in the community wetland at the edge of Long Quan village, a Naxi settlement about 25 kilometers from Dayan Town. Live fish are considered the ultimate delicacy in Chinese culture and fish in an exposed, unguarded lake were usually open game. When I asked a young villager why nobody caught the fish, he simply answered "don't try it if you want to live in the village." The significance of the fish, of course, went beyond restraint and self-discipline. Serving as a buffer zone between the local spring and the three-well system that nourishes the land and villagers, the community wetland was crucial in keeping the water source rich, clean, and in ecological balance. The fish, just like the vegetation and birds around the wetland, were an important indicator of ecosystem health. The fish at the Long Quan community wetland became for me a symbol of Naxi ecological knowledge, respect for nature, and traditional community self-regulation. The last time I visited in February 1998, the fish were still there, strong and healthy as ever.

A command and control regulatory approach views unplanned uses and activities as problems. Within the context of local resource uses with a long successful traditional approach to sustainable resource management, the regulatory approach often contradicts the ultimate goal of ensuring long-term benefits to local residents. Until the system finds a way to accommodate local use and integrate traditional knowledge, this contradiction will remain.

Beyond conservation and efficient use

If we confine our analysis to the twin mandates of conservation and revenue, the Bureau of Forests is doing an admirable job. The total area of reforestation for 1994, 1995 and 1996 is 27,500, 30,000 and 48,000 mu respectively. Supporting these impressive statistics are visible evidence between my field trips. Young trees can be found where there were no trees before, and where there were young trees before, there are now more and

bigger trees. Thanks to a high stumpage rate of ¥30 to ¥80 per cubic meter, the bureau has managed to maintain a satisfactory level of forest revenue without having to compromise the conservation objective (Qi Xuzhong 1985). Is this sustainable? The answer depends on how the question is framed. Conceivably, the question of sustainability could be framed in three ways. The first one relates to sustainable timber extraction, the second aims at managing the forest as a sustainable ecosystem that supports sustainable timber extraction, and the third is sustainable timber extraction through sustainable ecosystem management that is compatible with local knowledge and use. Apparently, the difference between each approach is much more than rhetoric. We will look at each of these questions in turn.

1. Sustainable timber extraction. Sustainable timber extraction is an important management objective for the Bureau of Forests. It drives the basic management strategy of regaining the Lijiang forest cover to 70% through reforestation and containing the AAC below the estimated regeneration capacity. So far, the strategy is working well. Ten to fifteen years from now, Lijiang will begin to see the benefit of its reforestation and conservation policy. If we use the current 40% forest coverage and 70% goal as a reference point and extract a ratio factor of 1.75, we could apply the ratio factor and make a crude estimate of the expected increase in regeneration capacity and AAC. Estimations of this kind are more for illustration of a trend than prediction in quantity, and the trend shows Lijiang entering into the beginning phase of a sustainable cycle.

For the positive trend to continue, several large assumptions have to stay in place. Policy is probably by far the most important condition. Locally, the conservation and reforestation objective is largely driven by the tourism development priority, while the national policy framework is the protection of forest cover in the Upper Yangtze. Stable policy, especially local policy, is largely dependent on stable market conditions, or more specifically, on stable and rising timber prices. If timber prices start to fall or fluctuate, so will the revenue contribution from the forest sector. Ultimately, this scenario will test the Lijiang government's resolve to maintain its conservation and reforestation policy in the face

of falling revenue. Next in line is that forest management functions continue to be centralized through the Lijiang Bureau of Forests, as compared to a scenario where control is returned to the state. Similar to the condition of local control is the current relatively decentralized system of state-, and community-owned and managed forests. Currently, Lijiang practices labor-intensive selective logging, a crucial factor in maintaining sustainable harvest management. Finally, a dramatic increase in infrastructure in parts of Lijiang where it is now lacking, such as modern roads and electricity, may also have an important impact on sustainability due to increased operability, production cost reduction, and enhanced market access. Finally, it is also necessary to assume that catastrophic forest losses will not be experienced due to disease or fire.

2. Sustainable ecosystem management that supports sustainable timber extraction. Given the present social, economic, and institutional conditions in Lijiang, there is no reason to predict dramatic changes to the above assumptions in the foreseeable future. However, there is a crucial difference between sustainable timber extraction and the maintenance of a sustainable ecosystem capable of supporting timber extraction. The former is best described as a tree farm, while the latter is capable of supporting a variety of species that do not necessarily contribute to timber value but nonetheless depend on the existence of a healthy, diverse forest ecosystem for habitat. In the field of forest management in Lijiang, this distinction is often lost. A perfect example is the way "tree planting" and "reforestation" are used interchangeably in the forestry regulation. The only criteria the regulation provides pertaining to tree planting and reforestation are growth rate, economic value, timber value, and value as fuel (Lijiang People's Representative Assembly Standing Committee 1993b, 5).

If the concept of reforestation in the regulation is biased towards a tree farm model, there is an equal lack of ecosystem awareness in the Bureau of Forests' approach to forest management. As intensified as the management system is, there is no indication of ecosystem considerations of any kind. One revealing incident occurred when visiting the

bureau in December 1995. I was attracted to a colorful poster of endangered and nationally protected birds and wildlife. According to the regulation, hunting of nationally protected species is forbidden in all areas, whereas hunting of any kind is prohibited in areas with high tourism value. Impressed by the long list of protected species and beautiful graphic, I asked for habitat information. However, none could be provided as no systematic study of habitat and environmental sensitivity had ever been conducted. This explained why there is no habitat conservation requirement when an applicant files a logging application. Apparently, the bureau took the regulation quite literally—no hunting of endangered and nationally protected wildlife is allowed. Nothing more and nothing less. Thus, if the wildlife disappear altogether from Lijiang because of habitat destruction, which is a destructive force more effective and thorough than hunting, the bureau would still perfectly fulfill its mandate as long as the extinctions were not due to hunting activities.

From dramatic deforestation between the 1960s and the early 1980s to the conservation and reforestation policies in the 1980s and 1990s, much improvement has been made. To move beyond sustainable timber extraction to incorporate environmental and ecosystem concerns into forest management decisions, however, Lijiang still has a long way to go. This path, of course, is not unique to Lijiang, and much insight could be gained from an examination of the historical development of resource management in North America. This history can be grouped into four periods which began with utilitarianism, then the conservationist movement, integrated use, and finally ecosystem management (Nash 1990). While utilitarianism represents the brutish, polluting, and wasteful resource extraction of the early pioneer period in North America, the conservationist movement promoted sustainable and efficient timber extraction and regeneration. As much as conservationist approach to resource management shows stewardship and management responsibility as compared to the earlier stage of utilitarian mentality, conservationist management objectives are still narrowly focused on maximization of timber extraction. Environmental and ecosystem concerns are yet to enter into forest management decisions. With Rachel Carson's best seller, *Silent*

Spring, in 1962, environmentalism started to gain momentum in the United States in the 1960s, culminating in the adoption of the landmark *National Environmental Policy Act* (NEPA) in 1969, the first important environmental legislation in North America (U.S. 1969). Resource managers' response to the environmental movement has been to adopt integrated resource management. The basic principle of integrated resource management is to recognize and manage for nontimber uses and values in a forest. Eventually the concept of the forest as an ecological community began to emerge. Although integrated resource management is still very much the buzz word for mainstream resource management in North America, the current thinking is that human harvesting activities should be dictated by natural boundaries and processes. Clearly resource management in North America is entering into a period of ecosystem management (Nash 1990).

3. Sustainable timber extraction through sustainable ecosystem management which is compatible with local knowledge and use. Taking the North American experience as a context, forest management in Lijiang can be described as advanced conservationism. If the North American experience were to be repeated, Lijiang would move towards integrated resource management and eventually ecosystem management. In this kind of scenario, what needs to be analyzed and promoted are the necessary policy and institutional arrangements that would allow the resource management regime to move forward. What is distinctively missing from this scenario, however, is an understanding of how local use, local knowledge, and community self-regulation fit in. This challenge brings us to our third framework of sustainable timber extraction-oriented forestry through sustainable ecosystem that is integrated and reconciled with local knowledge and use.

Traditional knowledge is often portrayed as backward, superstitious, and primitive. Traditional use of forests is typically perceived as destructive and irresponsible. This bias is as transparent in the forest regulation as it is in the Bureau of Forests' approach to management. Even Yang Fuquan, in an eloquent article on the constructive relationship between Naxi culture and ecology, apologized for the "religious and superstitious elements

in community rules and customs" before affirming their role in protecting environment (Yang 1997a, 5). What is striking, however, is the remarkable similarity between Naxi teaching and cutting edge ecosystem principles, perhaps not something that would be expected from a supposedly primitive knowledge system based on superstition.

A quick survey of ecosystem management principles might include the following: timber is but one value from a forest; forests provide habitat for a variety of species; a healthy habitat depends on a healthy forest which requires a natural mix of local species; the impact of human disturbance has to be understood and managed within this context; a forest is one part of an ecosystem which has to be respected on its own terms; human boundaries and processes must conform to natural boundaries and processes; and due to the poorly understood complexity of ecosystems, caution and risk management should dictate human management activities. From the Elders Committee to the agreement between Shu and Gu to the Long Quan community wetland and three-well system, there are clearly numerous examples of ecosystem management principles embedded in Naxi teaching, beliefs, and most importantly, the way they live.

While the reconciliation and integration of traditional knowledge and use into the overall forest management regime should be based on an ongoing dialogue among leaders—the Bureau of Forests and local communities—some common sense rules could be immediately established and implemented. One such rule might be that where traditional knowledge and the self-regulatory system remain strong, they should be used as the basis for forest management. For example, an agreement between the Bureau of Forests and Naxi communities on overall AAC and reforestation objectives would be sufficient to provide a regional perspective. Policy and institutional infrastructure should be adapted to allow the local community to operate on a self-regulatory basis. If the bureau and local leaders have concerns regarding local use and practice, they could be raised and resolved within the Elders Committee. Another common sense rule might be that where traditional knowledge and the self-regulatory system are damaged, joint efforts between the bureau and Naxi communities

could be made to restore the system. Meanwhile, a transitional agreement could be reached. A third and final rule might include consultation with communities on any proposals that have potential impact on a community's ability to maintain and operate its self-regulatory system.

Summary

As much as local opinions differ on management principles, there seems to be a consensus in Lijiang among local leaders, government officials, and citizens that forests are an important natural resource that they would like to maintain for future generations. This consensus could be sufficient common ground for a common vision. On one hand, the Lijiang Bureau of Forests has a long way to go from conservation-oriented management to an ecologically based system. Along the way, there will be the difficult requirement for fundamental changes in policy and institutional design. On the other hand, traditional cultures in Lijiang have been practicing ecologically sound forest management for hundreds of years. This dichotomy represents some interesting challenges and opportunities. Conceivably, environmentalism could gain momentum in China just as it did in North America in the 1960s. Eventually, this could translate into changes in forest management practices towards ecological principles, assuming there is still any ecological system left in Lijiang to be managed. However, Lijiang could take advantage of its traditional community-based sustainable forest management system, it could become a leader in the field of ecosystem management in China.

Chapter III

Agriculture: the modernization dilemma

With 79% of households engaged in agricultural activities, agriculture is obviously of crucial importance to Lijiang's economy. The agricultural sector is characterized by subsistence farming. The commodity rate is 13.31%.[12] The average grain production per person for the whole county is currently 395 kilograms. While statistics in 1996 indicated that there were still 64,300 persons in Lijiang living below the poverty line of 300 kilograms per person, the number is unreliable as it does not take into account beans and potatoes both of which are traditionally relied upon by locals as staple crops. For farmers to maintain subsistence, they need much more than just staple crops. Vegetables, fruits, animal feed, fuel, construction materials, and medicine are equally important, and they are all provided for through agriculture.

This self-sufficient system, however, is under enormous pressure to change. The pressure comes from several sources; the young leaving the land for city life, industrial and commercial competition for land,[13] a national policy of agricultural modernization, to name just a few. It is within this context that we examine agriculture in Lijiang and its sustainability.

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[12]The commodity rate is the percentage of agricultural products traded on the market for cash. Barters, however, are not included.

[13]Analysis of satellite images for 31 cities in China shows that urban land use expanded by 50.2% between 1986 and 1995. The ratio between urban land expansion and urban population increase is 2.29:1 (He 1997).

Traditional agriculture and agricultural modernization policy in Lijiang

Field observations during the last seven years revealed that farming in Lijiang is conducted mostly with traditional methods. Fertilizers are mostly organic. One of the early morning rituals in Dayan Town is that of farmers from nearby villages collecting human waste and organic garbage from public toilets and garbage stations. According to the director of the Bureau of Environmental Hygiene, the authority in charge of garbage collection and disposal, the removal is done by farmers at no cost to the bureau, as farmers sometimes have to compete for them. The real threat to the system is the increasing amount of toxic and nonbiodegradable commercial garbage mixed with the organic. While this is now manually processed by the farmers, it could reach a stage where the present system is no longer feasible should commercialization of Dayan Town, the source of the toxic and nonbiodegradable garbage, continue to accelerate. The town's garbage is transported either in pails carried on shoulder poles or in push carts to pits scattered throughout farm lands. The garbage is allowed to ferment and decompose until it is ready to use. At this time, it is either ladled into irrigation canals or mixed with water before being sprinkled manually over crops.

Farming is mostly done manually with the help of animals, especially oxen for tilling and horses for transportation. Use of farm machines is limited. In the more remote communities, such as Da Dong, Ming Yin and Feng Ke, machines are not used in farming at all. Where machines are used, it is primarily limited to transportation and plowing. On average, mechanized tilling accounts for about 5% of total arable land (Lijiang Research Institute of Agricultural Machinery,1985, 28). Oxen play essential roles where machines are lacking. Not every family can afford an ox. This problem is resolved by the organization of what is locally known as an "ox family" or Niu Qing Jia, a traditional system whereby several families share the same animal with each contributing either money or labor. Even with oxen, plowing is highly labor intensive. Typically, it requires one person guiding and pulling the animal from the front with two others at the back to weight the plough deep into

the soil. A 1983 statistical study reveals that an average of 20 to 24 person days of labors are required to cultivate one mu of land (Table 6).

Table 6 Per Mu Labor and Animal Time Requirement Analysis

	Wheat		Corn		Rice	
	Labor	Animal	Labor	Animal	Labor	Animal
	(day)		(day)		(day)	
Land Preparation	8	2.5	6.5	1	6.5	1.5
Planting	2.5	0	2.5	0	8	0
Crop maintenance	3	0	5	0	4.5	0
Harvesting	7	0	7.5	0	5.5	0
Total	20.5	2.5	21.5	1	24.5	1.5

Source: Lijiang Research Institute of Agricultural Machinery, 1985, 14.

When approaching villages in Lijiang, what strikes visitors most is the organic nature of agricultural land use. Farm lands come in various shapes and sizes, snuggling perfectly into the similarly irregularly shaped landscape. Separating one piece of land from another are trees, small irrigation canals, and narrow dirt trails that are barely wide enough for one person to walk. Crop species are just as varied. Grains, beans, corn, and potatoes grow side by side with vegetables and medicinal plants. To a large extent, this is dictated by the self-sufficient nature of local agriculture which has to satisfy basic household needs beyond providing nutritional food. Again, field observations are confirmed by statistics (Table 7).

Table 7 Species, Production, and Planting Area Analysis (1985)

	Planting Area (hectares)	Production (tons)
Wheat	14512	41266
Rice	4232	17773
Corn	14563	47762
Beans	10624	21214
Potato and Sweet Potato	2722	5597
Oil Species	1983	3504
Rape Seeds	1800	3284
Tobacco	2169	3295
Medicinal Plants	233	not available
Vegetables	1062	not available

Source: Lijiang Research Institute of Agricultural Machinery, 1985, 11-12.

Based on these data and observations, it is easy to conclude that agricultural policy in Lijiang has always been one of self-sufficiency through organic, traditional and integrated farming. Documents and interviews suggest, however, that official agricultural policy in Lijiang has always regarded traditional, organic farming backward and something to be replaced by modern methods. In other words, traditional farming has survived despite a hostile policy of agricultural modernization.

Agricultural modernization is at the forefront of the drive towards the four modernizations of agriculture, industry, science and technology and national defense—the centerpiece of development policy in China. While economic reform is the invention of the

1980s, the national policy of agricultural modernization finds its roots in the early days of collectivization in the 1950s. One perfect example of how this policy has played out in Lijiang is the campaign to replace human and animal plowing with tractors, which, for the longest time, has symbolized modern agriculture in China the same way smoke puffing chimneys symbolized industrialization.

Before 1955, tilling in Lijiang was done entirely with ploughs pulled by animals. Plough sizes varied with the most popular ones at either seven or ten inches. Double ploughs were also used. The first recorded use of tractors was on May 1, 1956. La Shi, an agricultural basin southwest of Dayan Town, borrowed two Hungarian-made SL50/55 diesel tractors for a demonstration. Many elders still recall the spectacle that attracted hundreds. Some came from as far as Feng Ke and Ta Cheng having walked for four to five days, bringing their own foods and blankets. When another two tractors returned to Lijiang in 1957, both were again made in Eastern Europe. They were part of a construction team and were used in building the Tuan Shan Reservoir.

Unsatisfied with the rate of progress, or the lack of it, the Yunnan Provincial Government allocated ten tractors to Lijiang in 1958. Five were D-40 from Poland, and the other five were ZT-35 from Czechoslovakia. A tractor station was established in July to provide tilling service to farmers for free. The actual use of these machines, however, was very limited. Because they were not properly maintained, the down time was both long and frequent. As local repair capacity was almost nonexistent, they had to be hauled to Kunming for repairs, a process both costly and time consuming. When the tractors were up and running, the local government had to pay for the fuel, which was very expensive.

To make the operation more economically feasible and to properly service the tractors, the local government started collecting fees in 1960, first on fuel and later on service on a per mu tilled basis. If farmers did not have much reason to use tractors before, the fees made them even less attractive. In 1961, domestically made East Is Red-54 tractors were first introduced into Lijiang.

Throughout the 1960s and 1970s, agricultural mechanization continued to dominate national agricultural policy, and the tractor facility in Lijiang continued to expand. By 1982, Lijiang had 206 tractors, almost six times the 35 of 1962. Meanwhile, the same problems persisted. Although the tractors were provided by the provincial government for free, the local government did not have adequate funds to maintain them properly. Because farm plots in Lijiang were highly scattered, tractors had to spend much time on the road traveling from location to location. Due to these problems, it was rare that tractors could provide services when and where they were actually needed (Lijiang Research Institute of Agricultural Machinery 1985).

As the history of tractor promotion in Lijiang demonstrates, traditional farming persists despite an aggressive policy to replace traditional farming with modern agriculture using machines and chemicals. The major reason for this is that modern agriculture simply does not have the proper infrastructure in Lijiang to survive and prosper. At an economic level, infrastructure refers to everything from repair service, competitively priced fuel, parts and other supplies, field size, sources of loans and loan guarantees, managerial and other expertise to roads and electricity. At a deeper social and cultural level, tractors and chemicals simply do not fit into the self-sufficient way of life for locals. While they are concerned about yield and productivity, the reason d'etre for modern agriculture, yield and productivity are by no means the only concerns. Traditional agriculture is not just a way for them to make a living, it is an expression of the culture, of how they relate to their lands and environment.

Agricultural policy, cultural orientations, sustainability, and public participation

Tariq Banuri observed that the crucial difference between so-called modern and traditional methods is not in the technique, but in the different world views they reflect. According to Banuri, all cultures, modern or traditional, can be analyzed through the way they "map out" the relation between individuals and their social and ecological environment.

From this starting point, it is then possible to conceptualize all cultures as guided by relational and/or impersonal cultural maps.

Relational vs. impersonal cultural orientations

The relational cultural map defines individual identities only within the context of their relationship to their social and ecological environment. In a relational map-oriented culture, people see themselves as part of their social and ecological environment, and their relationship with nature and one another as one of interdependence. The impersonal map, on the other hand, defines individuals as self-contained, autonomous beings separated from and independent of their social and ecological environment. In an impersonal map-oriented culture, individuals see themselves as embodiments of humanity, as rational and independent, and their social and ecological environments as serving the needs of independent individuals.

Banuri argued that while no culture can truly operate on any single orientation, modern western culture is unique in the sense that it separates the two orientations and champions the impersonal map as superior. Supporting and supported by marketization, economic and political power, and modern science and technology, the modern culture sets out to cultivate the world towards impersonal relations through systematic assimilation of relational map-oriented cultures while suppressing relational tendencies within the modern culture itself (Banuri 1990, 73-101).

Putting Banuri's analysis into a sustainability context, it could be argued that although it needs to be balanced with the impersonal orientation, the relational orientation is crucial to sustainability as it recognizes the limitations of human activities, recognizes our rightful place in an interdependent, interactive system, and takes responsibility for the consequences of our actions. In other words, the modern agriculture could very well be sustained over a long period of time, as the system gets more and more sophisticated with proper monitoring and feedback mechanisms. But ultimately, it is the relational map-oriented traditional knowledge system that is truly sustainable on social, cultural, economic and

environmental accounts. The central valley irrigation project in California provides a perfect example.

Conceived and constructed in 1930s and 1940s, the central valley project aimed at collecting the plentiful but seasonal rainfall in northern California, lifting it more than 3,000 feet and carrying it hundreds of miles to the south, which had abundant fertile land but very little water. The project was hugely successful. Large-scale modern agricultural businesses were attracted by the project, and overnight California became one of the largest food production bases for North America and the world. Everything worked well except one fundamental problem—the project ignored some very basic ecological principles and completely failed to recognize our dependence on such principles. Short-term gains were quickly overtaken by long-term problems such as destruction of in stream use, severe salinization, soil deterioration, aquifer contamination, aquifer depletion, drought and subsiding ground level. In the short and medium term, money and technology could provide bandage solutions. Over the long run, there was no real answer to system-wide collapse.

It is thus clear that the decision to modernize agriculture in Lijiang would have far more implications than the disappearance of oxen working the fields and the appearance of tractors and other farming machines. While modernization, agricultural or otherwise, within the Chinese economic reform context is increasingly couched in the language of scientific and rational decisions, Banuri points out that ultimately these are social and cultural choices. As such, they cannot be delegated to or dominated by the so-called technical experts. This does not deny the importance of resource managers and their technical expertise. Technical decisions, however, should always be situated within the larger social and cultural context. To decontextualize technical decisions is often to impose an impersonal cultural orientation hiding behind the language of progress and technical neutrality. In Banuri's words:

> In our view, the main problem with the debate on the 'meaning of development' was its aim of 'technocratizing' the notion of progress, of simplifying and quantifying it in such a fashion that anyone equipped with a handy and simple tool-kit could pronounce judgement on the desirability of a course of action or a set of policies for any group of people, whether or not the evaluator had any direct interest in their welfare. (Banuri 1990, 96)

Three analytical frameworks of public participation: Arnstein, Friedmann, and Esteva

If technical exercises are ultimately social and cultural choices, they have to take direction from people themselves. An obvious vehicle is public participation in planning and decision-making processes. The effectiveness of public participation is often analyzed as ranging from informing the public to genuine co-management and delegation of power. Sherry Arnstein has described the effectiveness of different public participation schemes as a spectrum ranging over "a ladder of citizen participation." According to Arnstein, the ladder could be divided into three sections: nonparticipation, degree of tokenism, and degree of citizen power. Communication under nonparticipation mostly serves the function of manipulation and therapy. The three rungs in the "degree of tokenism section include information, consultation and placation. Schemes for genuine citizen power are partnership, delegated power and ultimately citizen control (Table 8).

Table 8 A Ladder of Citizen Participation

Degrees of Citizen Control	8. Citizen Control 7. Delegated Power 6. Partnership
Degrees of Tokenism	5. Placation 4. Consultation 3. Informing
Nonparticipation	2. Therapy 1. Manipulation

Source: Arnstein 1969, 216-224.

The larger, assumed context for this kind of analysis is a representative democratic system and the institutional arrangements through which it is implemented. Therefore, the kind of citizen control Arnstein talked about is to return control to communities through decentralization so that "participants or residents can govern a program or an institution, be in full charge of policy and managerial aspects, and be able to negotiate the conditions under which 'outsiders' may change them" (Arnstein 1969, 261). Many similar analytical frameworks exist, and they are often useful in evaluating degrees of public participation in institutions.

If we regard the three sections of nonparticipation, tokenism, and citizen power as distinct paradigms of governance, we are faced with the question of how does an institutional regime move from one paradigm to another. In analyzing public planning and policy institutions and processes, John Friedmann believed that paradigm change can only happen as a result of activities in the periphery among people and groups who do not play by the rules. Friedmann described the planning and decision-making functions in public institutions as falling into two categories: system maintenance and system renovation. System maintenance functions refer to resource allocation activities according to prescribed rules, processes and procedures. This dictates the day-to-day running of an institutional system. Without challenging the basic institutional structure, the system is also capable of generating renovating activities in response to public and other pressure for greater efficiency, accountability and participation. However, Friedmann believed that the system itself, because of its commitment to the existing power and institutional structure, is incapable of initiating a paradigm change. That has to come from people and groups operating outside the system (Friedmann 1987).

Friedmann's framework is useful in analyzing alternative movements who challenge the institutional status quo. Or do they? In *Regenerating People's Spaces*, Esteva pointed out that terms such as community empowerment, public participation and decentralization are very much part of a development discourse, however "alterative" they appear to be. True

community control, according to Esteva, is only possible through rejecting the development discourse including alterative development, and through returning to a collective identity, to a traditional relationship with each other and with environment, to cultural and community independence, and to the principle of localism.

To successfully regenerate autonomous people's spaces, Esteva argued, it is necessary to reject the right and left ideological frameworks of the institutional system as a pyramid, a network or a spider web, as these frameworks necessarily imply hierarchy, dependency, power relations, formalized structures and institutionalization. To successfully regenerate people's space, it is necessary to reject the right and left language of development, decentralization, public participation, and structural change, to name just a few, as this language necessarily embodies a vision of homogenization through assimilation of different ways of seeing and being into a global vision (Esteva 1987, 155-171).

Clearly, Esteva is talking about the survival of peoples and cultures whose very ways of living are not represented and arguably cannot be represented in a representative democratic system in its present form. If Banuri described the difference and conflict of impersonal and relational map-oriented cultures, Esteva approached the subject from governance.

All these analytical frameworks for examining public participation from Arnstein and Friedmann to Esteva are relevant to Lijiang's situation. Together, they point to a course of action. Given the personalized hierarchical nature of decision-making processes in China, institutionalizing public participation at different stages of planning and decision making is undoubtedly very important. Institutionalized public participation is a crucial part of a civil society, the emergence of which, in turn, is a crucial precondition of any meaningful public discussion of goals, impacts and alternatives. In other words, without a basic institutionalized framework of public participation, the "peripheral activities" Friedmann talks about as crucial in initiating paradigm changes simply cannot exist, except in an illegal form.

Meanwhile, we have to go beyond the paradigm of agricultural policy, sustainability and public participation, and keep the discussion within the larger context of social and cultural choices, with the goal of maintaining and/or generating the necessary conceptual and resource base upon which people can effectively exercise their choices.

Summary

Ultimately, only people in Lijiang can decide whether they would like to maintain the traditional agriculture and lifestyle, and at what cost and to what extent they could participate in and interact with the global market without compromising system integrity. The irony of modernity is its relentless obsession with obsolescence. In its pursuit of modern agriculture, Lijiang is actually chasing a system that is quickly becoming obsolete because of its insensitivity to the social, economic, and environmental context. Meanwhile, it is trying to replace a timeless system that truly represents a sustainable future—modern in the true sense of the word.

Chapter IV

The twin rising stars of tourism and hydroelectric power

Ambitious seems an understatement to describe Lijiang's plans to develop its hydroelectric power and tourism potentials. All-season skiing on a glacier at 4506 meters above sea level, 2911 meters of cable cars capable of lifting 420 persons per hour up 1150 meters to the glacier, multi-function alpine resorts, and five potential hydro stations on the Golden Sand River generating enough power for all of southwestern China, the list simultaneously inspires excitement and alarm.

It is not, however, accurate to describe the twin megaprojects of tourism and hydroelectric power as local plans. With the former funded by the province and the latter by the national plan, Lijiang has little funds to contribute towards their completion. On the surface, it looks like a very good deal for Lijiang as the cost is mostly borne by the provincial and central governments while the region reaps the benefit. This might be true if the economic impact could be isolated from the resource, environmental and social impacts.[14] The tunnel vision of planners appears to be focused solely on economic ends, while locals' desire to maintain Lijiang as a place to live, not just as a place to work or visit, is ignored in the name of development. When such projects are hierarchically conceived and implemented, irrevocable social and environmental damage becomes a real possibility. As both hydroelectric power and tourism in Lijiang are heavily resource dependent, social and environmental sustainability, or lack of it, will ultimately challenge the long-term economic viability of these monumental projects.

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[14]Even the alleged economic benefit to the local community is a question mark at best. Case studies around the world show that megaprojects with outside control and investment often bring little economic benefit to the locals.

Tourism: the marketing of a shangri-la

Yunnan Province, blessed with diversified cultures, spectacular natural landscapes and the exotic Burma Road, has been developing its tourism industry for sometime. In 1994, 522,000 overseas tourists visited Yunnan, an estimated annual increase of 27.63% over fifteen years since 1979. By the end of 1994, Yunnan had built 20 luxury hotels as joint ventures with overseas partners who jointly invested US$63,730,000 (Lin Ming 1995, 1).

The inclusion of Lijiang in the international tourism circuit, however, was fairly recent. Lijiang was first designated a Class B tourism destination status with very tight access restriction in July 1985. At the time, Dayan had only 1,084 hotel beds spread over five guest houses, three state-owned hotels, and eleven collectively and privately owned hotels, with no commercial airport facility. The annual tourism capacity was estimated to be 56,000 domestic and 11,000 overseas visitors (Lijiang Bureau of Culture 1985, 26). A breakthrough occurred when Lijiang was chosen as the site for the 1993 Yunnan Province Tourism Convention. Chaired by the governor of the province, the convention marked the official acceptance of Lijiang as a tourism hot spot into the provincial plan with a pledge of financial support. Since 1993, large infrastructural projects have been initiated and completed, including an airport, roads, and a telecommunication network. Other investment followed. Hong Kong investors funded cable cars climbing the slopes to a subalpine meadow in a nature reserve. Luxury hotels were built by investors from Kunming and Thailand. During high tourist seasons, as many as four daily flights were scheduled between Kunming and Lijiang.

From the earliest stage of development, Dayan Town and Jade Dragon Snow-Capped Mountain were identified as the centerpieces of Lijiang's tourism. Dayan was an obvious choice. With five hundred years of history and buildings, streets, and waterways dating back to the Ming dynasty, Dayan was the main reason why backpackers braved the 24-hour bus ride over a murderously bumpy and dangerous road from Kunming to Lijiang. Dayan's

jewel-in-the-crown status was further confirmed after it was officially designated as a UNESCO World Cultural Heritage Site in December 1997, a process that took years of work and preparation. The Jade Dragon Peak area was chosen for very different reasons. Most overseas visitors to Yunnan are from Southeast Asia due to a combination of physical closeness, affordability, and Yunnan's exotic image promoted through aggressive marketing. Many visitors from tropical Southeast Asian countries are fascinated with snow, a fact obvious to anyone who had witnessed Southeast Asian visitors jumping up and down around small patches of dirty snow in Beijing. The Jade Dragon Snow-Capped Mountain offers the closest year-round ice and snow in the region. An opportunity to play gulf with glaciers as background or to ski on a glacier, it was surmised, would be simply too good for Southeast Asian visitors to resist.[15]

Once the key attractions were identified, leaders and experts made excursions to survey existing examples and explore development options. Sites surveyed included the Nationality Village in Kunming, the World Village, and Miniature China in Guangzhou, and the Song Village in Hong Kong. Some of these attractions resemble museums others amusement parks. All involve commercial presentation of culture in a constructed setting that aims to entertain and, hopefully, educate. This notion of an educational amusement park or entertainment museum became the basic inspiration for tourism development in Lijiang. However, there is one major difference between Lijiang and these other tourist attractions. Lijiang, as exemplified by the Naxi in Dayan and the Yi in the Jade Dragon peaks area, is full of contemporary communities with living people and still vital cultures.

Once the projects were identified, development was promoted simultaneously on five major fronts: presentation, accessibility, capacity, and keeping visitors occupied (Wang 1997). Initiated in 1994, and still ongoing, the so-called "five-four-three-two-one project"

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[15] "Ice and snow tourism" in Lijiang is now officially one of the ten major tourism products for Yunnan Province (Xu 1997).

aimed at cleaning up Dayan and making it more presentable. When completed, the project would bring to Dayan improved running water, illumination of streets and public places, electricity, a modern fire-fighting network, a telecommunication network, modern public toilets, replacement of "worthless buildings" with public green space, and reduced population density (Qun 1995, 5). Accessibility projects mostly included the airport and new modern standard roads connecting the airport with Dayan and Dayan with the Jade Dragon Snow-Capped Mountain. Constructed and completed between 1993 and 1995, both were funded under the provincial plan. The total number of domestic and overseas visitors in 1996 surged to 900,000, a far cry from the modest full capacity estimation of 67,000 made in 1985. Fifteen hotels built to international standards were ready to accommodate visitors by the end of 1996. To keep visitors entertained and occupied, projects large and small were actively pursued and developed with everything from dance halls and video parlors to cable cars and alpine resorts (Lijiang Prefectural Government Office 1997, 60,291,295).

The locals, in the overall scheme of things, were viewed variously from being slightly problematic to obstacles to be removed. An example of the former included the public smiling campaign. "Everyone is a tourist attraction" (Xi Xin 1997). Apparently, the locals were perceived as not friendly enough to tourists, as manifested by lack of greetings with smiles. Illustration of the latter had to be the draconian plan to relocate the nine Yi villages from the Jade Dragon peaks area. For the most part, however, the tourism development impact on locals was subtle and mainly arose from the narrow fixation on physical facilities and appearance with little consideration of medium- and long-term impacts on people and their cultures.

Epitomized by the Lijiang Cultural Heritage Town Protection and Management Regulation, which was passed on July 20,1994 to protect and promote Dayan, and manifested through numerous tourism development projects, the policy and project fixation on physical facilities and appearance was quite apparent (Appendix D). The combined policy

and project impact on Naxi living in Dayan and their culture was equally apparent. To reduce population density in Dayan, rebuilding was permited on only one-third of the land area opened up when buildings were torn down. The rest was to be turned into public green space. This was further supplemented by a subsidy policy encouraging Dayan residents to move out of Dayan into suburbs. Local residents told me that because many Naxi elders could not conceive of leaving their homes, it was more often the young who moved to the suburbs breaking extended families into smaller nuclear family units. This was confirmed by my survey of local electoral registry posters, which were posted on public walls and carried name, gender and age of the electorate in Dayan Town. The aging of Dayan residents was quite apparent. Further contributing to the exodus of Naxi from Dayan has been high tourism-driven inflation,[16] entrepreneurial individuals from outside towns and provinces offering high rents and prices for Dayan properties, and residents' feeling like animals on display in a zoo.

With financial assistance after the earthquake in 1996, Dayan became physically more charming than ever. Supported by talented local craftsmen and sensible construction plans, ugly concrete structures built in recent decades were replaced with aesthetically pleasing authentic Naxi-style buildings, and damages old and new were repaired to very high standards.[17] Meanwhile, worrisome impacts on Naxi and Naxi culture in Dayan accumulated, causing much concern. On December 18, 1997, a conference was jointly organized in Dayan by the Yunnan Nationality Commission, Yunnan Academy of Social Sciences, and Yunnan Association of Social Scientists to discuss how to protect Dayan as a world heritage site

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[16]One comparison showed that chicken eggs in the Dayan market were ¥2 more expensive per kilogram than in Beijing (Xin Xing 1997).

[17]East Street, a concrete monstrosity in the heart of Dayan, was completely replaced with authentic Naxi wood buildings. More than 20,000 square meters of building space were torn down at a total cost of ¥20 million to the 17 owners of the space (Lijiang Prefectural Government Office 1997, 344).

(Jiang and Zhang 1997, 8). During the conference, Yang Fuquan and other scholars voiced serious concerns about the accelerated commercialization of Dayan and its negative impact on local people and their cultures. In an article appropriately titled "Anxiety at a Prosperous Time," Yang warned:

> The ancient Naxi nation living in the culturally famous town of Lijiang, as many other cultures, faces the ultimate challenge of how to avoid the repeated onslaught of urbanization, industrialization, and cultural homogenization. (Yang 1997b)

To what extent the concern for long-term viability of Naxi culture can be translated into strategy and actions remains to be seen.

The logic and impact of building megadams

Of all the resource management agencies in Lijiang caught in the transition from the centralized planning to a model with more local autonomy, the Bureau of Water and Hydroelectric Power suffers the most uncertainty. Almost all of the 33 medium to large size and 572 small size reservoirs in Lijiang were built during the heyday of centralized planing from 1950s to 1970s when centrally-funded construction projects utilized locally mobilized volunteer labor to complete projects in record time.[18] In the 1980s, however, these were dramatic cut backs in funding and volunteer labor can no longer be easily mobilized largely due to the greater autonomy of rural people under the household contract system.

Having to scramble to maintain the existing and deteriorating infrastructure, the Bureau of Water and Hydroelectric Power apparently had little capital to contribute to the

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[18]Reservoirs with capacities from 100,000 to 10,000,000 cubic meters are considered medium to large. Anything less than 100,000 cubic meters is considered small.

planned five megadam projects on the Golden Sand River.[19] While the Planning Commission does have a special task force assigned to facilitate the project, conversations with members of the force revealed that their role is strictly that of administrative assistants.

From my research, it was not entirely clear when and where the dream started. What locals remembered was that senior officials from county and provincial governments took personal interest in the project as early as the 1950s. Some of the sites, Tiger Leaping Gorge for example, have been surveyed several times since. Over the years, a high powered buzz was created out of the desire on the part of political leaders for monuments, the excitement of engineers at the prospect of building one of the biggest hydroelectric projects, the lobbying to attract national funding, the tunnel vision that excluded environmental and social impacts and alternatives, and a naive assumption that the undammed river represented wasted potential. This would have been hardly surprising in the construction craze of the 1950s and 1960s. That it has reappeared in the 1990s is disturbing.

If tourism is a favorite project of the province, the hydroelectric power development plan is so staggering in scale and cost that it is only possible with the national policy and financial support. It is hypothesized that the Golden Sand River can support five hydro stations with a total 2 billion kw capacity. Of the five, three have passed the feasibility study stage with the one at Jin An already incorporated into the national Ninth Five-Year Plan.

Technical difficulties aside, the social and environmental fallout would be enormous.[20] This is dictated by the unique geographic features of Lijiang. Immediately affected would be communities to be relocated along the Golden Sand valley. Some are quite

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[19]According to Hong Jianxin, a vice-director of Lijiang Planning Commission, eight sites are being considered for the five dams. They are Upper Tiger Leaping Gorge, Lower Tiger Leaping Gorge, Li Yuan, Er Hai, Jin An Bridge, Long Kai Kou, Nu Di La, and Guan Yin Hai.

[20]Technical difficulties include an earthquake prone geography, serious siltation, and extreme volatility in water flow, to name just a few.

large. For example, Shigu Town at the First Bend where the mighty Yangtze makes its first sharp turn toward the east, has 3,706 households with 18,422 residents (Lijiang Prefectural Government Office 1997, 69). However, the impact does not stop at the Golden Sand River valley. As the majority of rivers in Lijiang feed into the Golden Sand, communities along the valleys of tributaries will also be affected. This is because the Golden Sand River valley is shaped like a steep V. To get sufficient water storage and stabilize volatility, the dams require heights that will flooding tributaries.

There could be several relocation scenarios. In the first scenario, communities are relocated at higher elevation on the mountainside. Issues of agricultural viability, know-how, experience, and land productivity aside, moving up mountainsides would have serious ecological consequences. Lijiang is typified by steep mountains. As devastated landscapes in northwestern China verify, erosion is a real threat and recovery would be extremely difficult to virtually impossible. The second scenario is to relocate affected communities to unaffected existing communities. It is questionable whether this is feasible given the limited land availability and the scale of relocation. Assuming it is feasible, it would greatly intensify the pressure on land, create tension and conflicts among residents, and increase pressure to cultivate hillsides.

The hydro project, if and when completed, would result in a huge loss of habitats and natural resources. This is because the prime target for innundation, river valleys within the Golden Sand drainage, are the ecologically most productive areas in Lijiang. A rise in mercury levels in newly created reservoirs is a well documented effect of such projects. This effect will be more significant in Lijiang due to the large surface contact with land which is rich in organic materials.[21]

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[21] An article in *Lijiang Daily* appeared in December 1997 promoting large-scale hydroelectric power projects. The Three Gorges Project was said to be beneficial ecologically because "it lowers and raises the temperatures in summer and winter by two degrees respectively which provides a better environment for vegetation and wildlife growth" (Liu 1997).

While social and environmental impacts are likely to be devastating, the economic benefit remains a question mark at best. Partly, this is intrinsic to any large capital project. As the recent economic turmoil in Asia and the rest of the world demonstrates, demand from accelerating economic growth is anything but reliable. While steady and increasing demand is absolutely crucial to hydro projects of such an enormous scale, fluctuations in international financial markets, interest rates, and currency exchange are very real threats. Partly, this is because the economic benefits from megaprojects tend to flow out of, not into, the host community. The Lijiang government is counting on the dam(s) to propel the Lijiang economy into a prosperous 21st century. The Bureau of Urban Construction is already building the first modern highway through the county seat with enough road surface, water supply, electricity and communication capacity to accommodate 200,000 permanent residents by the year 2015. The projection of the needs is, in turn, primarily based on the infrastructural development required to service the hydro and tourism projects. Whether the dream of revenues from selling hydroelectric power will be realized remains to be seen. The stakes—economic, environmental and social—are very high indeed.

the absence of environmental and social impact analysis, however, is mostly due to the lack of political will. Extensive research on large-scale hydroelectric projects has been conducted throughout the world. Much environmental impact can be anticipated by learning from history. Surveying historical water diversion and hydroelectric projects in Canada, John Chadwick Day and Frank Quinn, experts on water and water management, concluded:

> A variety of biophysical changes are predictable. Moderate earthquakes and climate change are to be expected in the vicinity of large impoundments. Erosion and turbidity decrease primary biological productivity in some existing lakes and rivers. Forests, agricultural lands, and wildlife may be lost in perpetuity and existing fisheries habitats destroyed. Mercury is released into the water column and bioaccumulates in fish to levels which makes them unsuitable for human consumption. This condition persists for 20 to 30 years at a minimum and longer in areas where erosion of organic-rich soil continues. (Day 1992, 178)

In the last three decades, the trend in North America and other developed countries has been to move away from large-scale dam construction, as their devastating social and environmental impacts have become well known and documented. Gradually, the supply-driven, large-scale, irrevocable manipulation of natural landscape is moving towards sensitive alternatives such as demand-side management techniques. In a sense, what is being proposed in Lijiang represents the past, not the future.

Development as social engineering

Obviously, it is crucial to carefully evaluate the need, feasibility, and economic, social, and environmental impact before proceeding with any major policy or project. The level of effort is normally dictated by the duration (temporary or permanent), impact severity, scope (whether the impact is local, regional, national or international) and to what extent the impact is irrevocable. Meanwhile, the challenges facing leaders and resource managers are not merely to evaluate the economic need, eliminate or minimize negative impacts, and mitigate them where possible, however important these activities may be. The very idea of imposing large-scale economic development projects on a traditional community begs the fundamental question of social choice and who controls that choice. A famous historical dialogue between Gandhi and Nehru on the question of social choice for India captures the essence of the debate.

Gandhi and Nehru, two giants on the road to independence in India, had very different visions for the country. Gandhi wanted the British out to give Indians the opportunity to become more Indian, in particular, to allow *swaraj*, the calm freedom to pursue truth, to inspire and shape efforts to reinvigorate village life and traditional cultural values. For Gandhi, it was absurd to suggest that human fulfilment and happiness could be achieved through the accumulation of material wealth. Of course, there would still be a need

for India to have an economy, but its development would be subordinate to and made to serve the overriding cultural goal of creating a society in which individuals were enabled to pursue a spiritual way of life. Nehru, on the other hand, believed that a society *is* an economy, that the only way for India to be fully independent was to integrate into the global market and aggressively develop its technological and economic potentials (Sachs 1992, 15-16).

As much as global economic development through proliferation of market relations and technology transfers is firmly entrenched in our day-to-day language and social reality, in fact, the concept of international economic development as it is used today is a relatively new invention. Gustavo Esteva and other scholars who have critically studied the history of development concur that the language of development, and in particular, underdevelopment, was first articulated on January 20, 1949 when President Truman announced to the world during his inaugural speech the launching of a new era of development. The U.S. emerged as the dominant economic and military power after WWII. Truman found the perfect vehicle to fight the communist threat while providing profitable economic opportunities for powerful American corporations—development. "The old imperialism," Truman promised exuberantly, " has no place in our plans. . .What we envisage is a program of development based on the concepts of democratic and fair dealing." However, as Esteva observed:

> On that day (January 20, 1949), two billion people became underdeveloped. In a real sense, from that time on, they ceased being what they were, in all their diversity, and were transmogrified into an inverted mirror of others' reality: a mirror that belittles them and sends them off to the end of the queue, a mirror that defines their identity, which is really that of a heterogeneous majority, simply in the form of a homogenizing and narrow minority. (Esteva 1992, 7)

What has ensued, after Truman's speech, has been a half century of development.

The language of development might be new, but the proposition that the maturity of a society is primarily measured by ability to accumulate material wealth has its philosophical roots in left and right ideologies extending back far beyond Truman's time. From Adam

Smith to Karl Marx, societies and cultures have been viewed as marching along a linear path of development. At the low end of production and consumption, societies and cultures are described as backward, primitive, poverty stricken and underdeveloped. At the high end where production and consumption possibilities are more fully realized, societies are considered modern, advanced, prosperous, and developed. Societies and cultures are assumed to be predetermined to march from one stage of production and consumption to the next. Truman's contribution was to couch an otherwise violent and anti-democratic concept in a language of mutual prosperity and universal wealth through the seemingly neutral discourse of markets and technology.

While economics prescribes the basic ordering of society, science and technology are instrumental in translating the prescription into reality. The most scathing critique of modern science and its seeming neutrality comes from Vandana Shiva, a scientist, feminist and radical ecologist from India. Shiva pointed out that a scientific method of investigation is often violent in the way it relentlessly controls, manipulates and dismembers the object of study for the sake of accumulating scientific knowledge. This violent tendency in science finds its ultimate accomplice in the project of modernization where the imperative of progress through science and technology turns the whole world into the ultimate scientific laboratory and "other" cultures into objects of experiment.

Here, the violent connotation of scientific language takes on its most ominous meaning. Scientific experiments need to be guided by objectives and hypotheses. The vision of modernization through social engineering on a global scale conveniently provides both. Experiments need objects of study and manipulation. "Backward" cultures provide plenty of such challenges. Experiments need to impersonalize and dehumanize the object of study. The linear model of historical evolution of all cultures progressing towards the western model labels traditional cultures as "obsolete" and therefore justifies any elimination and assimilation of these cultures as progress.

Modernization is a violent project. The scientific method, in its impersonal, instrumental, manipulative, insensitive form, provides a convenient, powerful and violent vehicle through which the imperative of progress and modernization is imposed (Shiva 1992).

Throughout field trips in the last seven years, I have had numerous opportunities to exchange views on development with many local leaders, the majority of whom are themselves members of ethnic minorities. While they differ greatly in leadership style, almost all of them share a sense of urgency to "catch up" with more advanced cultures and the conviction that the only way for their people to get ahead is through modernization and economic development. Their jobs as leaders, therefore are to make transparent to their people the limitations of their traditional thinking because it is an obstacle that needs to be removed on the path to modernization. Douglas Lummis (1991) describes this kind of internalization as "colonization of consciousness," a process through which the conceptual space of oppositions and alternatives to development imperatives is contained or eliminated to the extent that victims of development blame themselves.

Critics of development as a homogenizing force are often accused of romanticizing misery and superstition in a paradise that never was. Suffice it to say that it is neither possible nor desirable to freeze any culture at a particular moment in time. What is at stake here is the authenticity and validity of cultural experiences outside the quantified realm of production and consumption and the right to self-discovery and self-determination. In this sense, hydroelectric power and tourism development projects are not necessarily intrinsically homogenizing and destructive forces in and by themselves. For example, many communities in Lijiang benefit from small-scale, low-impact hydroelectric power projects and ecotourism.[22] What is called for is what Esteva describes as an "autonomous space"

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[22]There are 24 small-scale township hydroelectric installations that generate 6,120,000 watts annually, or 92.5% of the total annual electricity generated in Lijiang (Lijiang Bureau of Township Enterprises

independent of the development agenda within which people can exercise self-determination and define development on their own terms.

Summary

Megaprojects inevitably have mega-social, economic, and environmental impacts. When megaprojects are conceived and imposed in the name of social progress with little local input, they become a thinly veiled vehicle for cultural homogenization.

Administration 1985,19).

Chapter V

Environmental protection and management

When asked during an interview what was the biggest problem facing the Bureau of Environmental Protection in Lijiang, bureau director He Rongcheng replied lack of environmental awareness and support. With extremely limited goals, a weak mandate, an inadequate budget, and a total staff of three, there was ample evidence in support of He's statement. The 1995 Economic and Social Development Plan for Lijiang had fourteen categories with fifty-seven goals including everything from high school enrollment and birth rate to grain production and labor productivity, but not a single environmental objective.

However, it would be absurd to draw the conclusion that the locals do not care about their environment. From the three well system to traditional land use design, the Naxi consistently demonstrate their sensitivity to the importance of containing human activities within a rich but fragile ecological context. This ecological sensitivity is central to their cultural heritage. Its institutional reaffirmation can be found in a proposal by He Wanbao to develop Lijiang into an ecological county.

A Naxi and member of the Lijiang People's Representative Assembly, He proposed in 1988 to the assembly that the future of Lijiang lay in maintaining the Naxi tradition of ecological harmony, not in its destruction. Eloquently documenting Naxi traditional ecological sensitivity, He suggested nine short-term and long-term environmental goals including reforestation, run-off and siltation control, microclimate improvement, revitalization of the Naxi environmental tradition, and promotion of integrated agriculture (He 1988).

Lijiang has a rich tradition in environmental protection and management. Little of this tradition can be found in the current institutional arrangement at the county level.

Environmental protection and management: goals, mandate and institutional process

Clear, well-defined goals are crucial to any effective institutional arrangement. Without these, it would be difficult to evaluate the effectiveness of an institution. Mandate, on the other hand, gives an institution a basic tool with which goals and objectives can be reached. Without a proper mandate, the role of an institution is advisory at best. Goals and mandate should be balanced. An institution with broad goals and very limited mandate is doomed to fail. Ultimately, the goals and mandate for the Lijiang Bureau of Environmental Protection come from national legislation within the *People's Republic of China Environmental Protection Act* (Appendix A).

Endorsed by the Standing Committee of the People's Representative Congress on December 26, 1989, there are two important and distinctive features about this legislation. The first feature is its project-oriented approach. The second is the interpretation of environmental protection as discharge control. Each feature has its own problems. Together, they reveal some fundamental flaws in defining environment and environmental protection in China generally and Lijiang specifically.

The *Act* is divided into five chapters covering general principles, environmental management, environmental protection, contamination, and legal responsibilities. For the most part, the *Act* is silent on when, where, and under what circumstances the legislation is applicable except for clause 13 in chapter 2 which states: "Polluting construction projects must observe the relevant regulations set out in the national legislation on construction projects." A further condition is provided in clause 29 in chapter 4, which states "Corrective measures with deadlines applying to industrial and nonindustrial organizations that report directly to central, provincial, autonomous regional, and municipal governments are determined by central, provincial, autonomous regional, and municipal governments respectively." While it remains to be seen whether a local government could take a liberal

interpretation of the *Act* and apply it to evaluate policy, the intention of the national legislation is clearly aimed at physical construction projects; the level of local authority does not extend beyond local projects.

A project-oriented approach has some concrete limitations. A major one is that it fails to monitor the accumulative impact on a regional and system-wide basis. Conceivably, each project could satisfactorily pass the review process while the system is failing as a whole. There are two potential remedies for this problem. One is to allow cumulative and system concerns to enter into the review process. For this to be effective, however, the hierarchical requirement that an environmental protection agency is only allowed to evaluate projects administered by governments at the same level has to be removed. It is more effective to apply environmental protection and review to both projects and policy. Acknowledging that environmental review at the policy level is extremely complicated and a theoretical framework and successful examples are yet to fully emerge, there is a consensus in the field of environmental and resource management that policy review is critical in any effective environmental protection and management at a system level.

While the legislation is somewhat ambiguous on how it should be applied, it is quite clear that whether a project will pass or fail an environmental review depends on whether it conforms to national discharge standards. Clause 10 states that the national environmental protection authority is responsible for establishing national discharge standards; clause 13 states that projects must follow national discharge standards; clause 18 declares that discharge in scenic attraction and protected areas are not allowed to exceed discharge standards; clause 30 warns that importation of technology and equipment that do not conform to national discharge standards is not allowed; and the list goes on.

While discharge control is an important aspect of environmental protection and management, the national legislation equates environmental protection and management of discharge control. There are some technical difficulties with this approach. Where national

discharge standards are absent, a provincial or local government has the option to occupy that space. The overall effect is that national standards become both the minimum and the maximum requirements. However, national standards may be insensitive to local conditions. What might be considered adequate in one situation may be completely inadequate in another. Ongoing monitoring and enforcement are a big challenge. In most cases, the standards are recommendations or guidelines not minimum requirements. The real problem, however, is that discharge control cannot replace a properly designed and implemented environmental review process.[23] Human activities impact the environment in many different ways. Discharge, releasing alien and toxic elements directly into air, soil, and water may be the most intrusive, but it is certainly not the only or the most insidious way economic activities negatively impact on the environment. The cable car project in the Jade Dragon peaks area is a perfect example. Powered by electricity, the cable car system has no discharge to speak of, other than an occasional change of lubrication oil. Yet its potential impact on the forest, glacier, wildlife, and local ecology is enormous.

Beyond the two distinctive features discussed above, the national legislation is silent on many important environmental protection and management principles. The word sustainable development or sustainability is not mentioned. This is not merely a linguistic oversight, because it symbolizes the recognition that economic activities are not sustainable unless they can be contained within the natural capacity as a resources provider and as a waste sink. There is no articulation of resource depletion concerns. There are no requirements for environmental impact analysis and review beyond the standard discharge analysis.

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[23]This problem is compounded by a tendency in Lijiang to equate environmental protection with tourism development. The dual identity of the Jade Dragon Snow-Capped Mountain as both a nature reserve and a primary target for intrusive tourism development is one example. Lashihai, the largest wetland in Lijiang, is also destined to become the next nature reserve/tourist attraction because of its biodiversity and exotic birds species (Su 1997b).

Clause 4 in chapter 1 of the general principles clearly states that the overall goal of the *Act* is "to balance environmental protection with economic construction and social development." Given its narrow focus on project-oriented discharge, and the absence of any sustainable development principles, the overall effect of this balancing act is to subject environmental concerns to economic rationale while maybe containing the most objectionable and visible form of environmental violation—discharge.

If the national environmental protection, management goal, and mandate are narrowly focused on discharge control at project level, how is it translated into the local institutional process in Lijiang? Again, there are two identifiable features. The first one is to interpret discharge control as input regarding discharge concerns in a project decision-making process. The second one is to take a very narrow, jurisdictional interpretation of what constitutes a "project."

Lijiang does not currently have any local regulations directly derived from the national legislation. The local discharge management function is exercised through a provincially established protocol known as the Yunnan Province Construction Project Site Selection Proposal Application and Approval Process (Appendix E). For the construction of each new project, a proponent must first acquire project approval from the responsible administration authority. Once the approval is obtained, a construction project site selection application form is completed, which contains, among other things, discharge information. The application, together with supporting materials, travels among agencies, starting from the agency specifically responsible for the particular type of project involved and the urban planning administration authority before being passed on to an unspecified number of unspecified authorities for comments.[24] The ultimate decision-making power rests with the county government, assuming that a project proponent does not report directly to provincial

[24]The sample application form I obtained has physical space for three.

or national authorities. The Environmental Protection Bureau is one of the unspecified agencies from which input is required.[25]

While national environmental protection legislation calls for discharge control, it is not the Bureau of Environmental Protection that performs this function, but rather the county government. The result is a potentially serious compromise on adequate consideration of discharge as an important factor in approving a project. One perfect example is the county government-owned Nankou Pulp and Paper plant. One of the most profitable local ventures for Lijiang government, with a total investment of ¥90 million (C$15 million), the plant had a production capacity of 15,000 tons of pulp and gross sales of ¥57 million (C$9.5 million) in 1991 (Lijiang County Government 1991). Located outside of Dayan and immediately next to the Yangong River, the plant is also the county's worst water polluter. The national standard calls for water quality of grade one. In remote rural areas under special circumstances, the standard can be relaxed up to grade three. The water quality in the reaches of the lower Yangong River below the plant consistently tests worse than grade five (China Ministry of Health 1991).

For years, despite the test results, the plant prospered and expanded. Only recently it fell out of favor with the county government because of government shift of policy priorities towards tourism development and the visible conflict between tourism and water contamination on the Yangong River between Dayan and the airport (Hua 1997). During my visit in February 1998, a public notice was posted in a village outside of Dayan announcing that the plant would be gradually closing down and, therefore, would no longer purchase straw material from villagers for use in paper production.

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[25]In a recent environmental report, the Bureau of Environmental Protection recommends that carbon dioxide releases from coal boilers and waste water from hospitals and hotels be processed; urban noise be controlled; and automobile gas releases be inspected. None of these recommendations are incorporated into official plans (Su 1997a).

While the Bureau of Environmental Protection's participation in decision making is limited to drawing attention to discharge issues, the scope of application is reduced from projects in general to urban construction projects. This is because the project site selection process in Lijiang is administered by the Bureau of Urban Construction and Planning. By extension, the process only applies to projects under the jurisdiction of Urban Construction and Planning. This is a serious problem as Dayan Town is the only officially designated urban site in Lijiang. Outside of Dayan, even in towns, the Bureau of Urban Construction and Planning has no jurisdiction and the site selection process does not apply. As Dayan Town has been pronounced a World Cultural Heritage Site, project proposals with heavy discharges are unlikely anyway. There is no mandate for environmental impact assessment, however, outside of Dayan and in the rest of Lijiang.

The general weakness of the national legislation is matched by comparable weakness in local institutional arrangements. Communication channels are vertical and hierarchical with virtually no provision for horizontal interagency communication, coordination and cooperation. A direct impact of this kind of institutional communication arrangement is that the Bureau of Environmental Protection has no means to raise environmental concerns and provide input into a decision-making process dominated by reductionist economic reasoning. There is no provision for the Environmental Protection Bureau to engage in environmental work outside the site selection process. Most critical is the lack of environmental planning, despite a "may" clause provided for in the national legislation (Clause 20). There are several other government agencies in Lijiang that perform aspects of environmental management and monitoring functions. Examples include the Bureau of Environmental Hygiene in charge of solid waste disposal, the Disease Control and Prevention Station in charge of urban water testing, and the Environmental Monitoring Station, which checks air and water quality in the Lijiang area. Interviews with leaders and staff from each agency revealed high levels of

commitment and expertise. A collaboration with these agencies could potentially maximize environmental review input.

Given its extremely limited jurisdictional goals and mandate, it is not surprising that the Bureau of Environmental Protection also suffers from a general lack of funding, information, policy tools, and other institutional support. In other words, the bureau has no capacity to take on more environmental management functions. The bureau has a total of five employees: the director, deputy director, and three staff members. There is also a general lack of institutional tools such as inventory information, environmental indicators, multi-stakeholder input and participation, expert advice, and data gathering and analysis. Without these basic tools, it is impossible to make thoughtful informed decisions, and the bureau is reduced to relying on manuals of national discharge standards. On the implementation and enforcement side, the bureau has no access to basic institutional instruments such as regulations, bylaws, guidelines, and compliance monitoring.

With accelerated economic planning and growth, Lijiang is in urgent need of systematic environmental planning and review beyond its present focus on project-oriented discharge review. While environmental management can be very complicated, consensus has emerged around some basic frameworks and principles.

Towards an environmental management framework

At the heart of any environmental planning and management is the basic principle that human activities must not exceed the natural carrying capacity. Violation of this basic principle, from a long-term perspective, leads to unsustainable development. Nature supports human activities by providing natural resources. As resources are transformed into, and consumed as, desired products, nature performs another crucial function of absorbing waste and discharge. The amount of waste and discharge, in turn, impacts on the quantity and

quality of natural resource stock. Depending on the level of human activities, resource input, and waste output, the cycle could be described as either positive, and therefore sustainable, or negative, and therefore unsustainable.

This principle is so simple it can be almost described as intuitive. Human history, however, is full of examples of gross violation of this principle. One powerful interpreter of human history and its environmental implications is Lewis Mumford. A world renowned critic of historical technological development, Mumford drew the crucial distinction between tools and machines.

> The essential distinction between a machine and a tool lies in the degree of independence in the operation from the skill and motive power of the operator: the tool lends itself to manipulation, the machine to automatic action. The degree of complexity is unimportant: for, using the tool, the human hand and eye perform complicated actions which are the equivalent, in function, of a well developed machine; while, on the other hand, there are highly effective machines, like the drop hammer, which do very simple tasks, with the aid of a relatively simple mechanism. (Mumford 1962, 10)

While machines have a qualitatively higher degree of independence, Mumford points out human interventions are always called for at stages such as design and repairs. Over the centuries, machines have developed into an exceedingly complex technological system. Human participation in this complex system is more and more reduced to a narrow logic of technological perfection and technological progress. In other words, the technological system has taken on a logic of its own, which is detrimental to long-term human happiness and survival.

While illustrating how the history of technology violates the basic principle that human activities have to be contained within the natural capacity to provide and absorb, Mumford also drives home the point that the impact of human activities is increasingly mediated through a global system. Therefore, local actions and impact can only be

meaningfully analyzed within a national or even international context—a challenge of extreme complexity.[26]

The second basic principle in environmental planning and management is that human processes have to follow natural processes. A perfect illustration of this principle, or the consequences of its violation, can be found in the human settlement along China's Yellow River and Yangtze River, two of the largest rivers in the world. A study of hundreds of large and small rivers around the world by Dunne and Leopold shows that water flow always follows a recognizable pattern. Rivers always meander. Over time, and if the land surface is erodible, the meander pattern always moves across the landscape towards downstream. The width, depth, and slope of a river are always proportional to the water flow. Each half meander pattern always includes a pool followed by a riffle. The ratio between the length of a pool and riffle segment is always around 6:1. In a natural kind of way, these basic processes make perfect sense. Because a river meanders, it reduces the flow impact on the land. The rhythm of pools and riffles reduces flow impact, creating a variety of habitats for different species at different stages of a lifecycle, and replenishes the oxygen where riffles break water into bubbles (Dunne and Leopold 1978).

Permanent human settlement on a flood plain, however logical in human terms because of its fertility and closeness to water, clearly violates some basic natural processes. A typical human response to this conflict is to restrain water flow by building dikes along a river. As the river tries to break out of its confinement and flow naturally, the dikes are fortified. As human settlement increases with more entrenched economic interests, the possibility of addressing the problem at a systems level becomes more and more remote.

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[26]Another example closer to environmental planning and management is *Design with Nature* published by Ian McHarg in 1971. Arguably one of the most influential early thinkers in environmental planning and modern ecology, McHarg documents devastation and insensitivity, and passionately pleas for harmonization of human activities with natural processes.

This is indeed the case with the Yellow and the Yangtze. The fight to contain nature has been fought for so long that certain sections of the river bed are maintained by dikes at a level higher than the ground on both sides. Annual flooding and damage to lives and property are as inevitable as the river's restless meandering.

The desire to contain water flow for human purposes is, of course, not unique to China. The most influential example in the west is probably Antoine Chezy's efforts to design ideal water channels. Hired in 1768 to study ways to improve the efficiency of water supply to Paris, Chezy proposed that the most efficient way of conducting water from point A to point B for a given discharge was through the smallest channel cross section and over the shortest distance. No wasteful riffles, pools, and meanders. In 1775, Chezy presented the famous Chezy equation with which the idealized channel could be designed. With minor modification by Robert Manning in the 19th century, the Chezy equation has been widely used in channel designs to this day. From the Panama Canal to the Central Valley irrigation system in California, man-made water channels worldwide testify to Chezy's ingenuity (Newbury 1994).

Water, however, never flows in the most efficient way idealized by humans. When water flow is artificially channeled using the Chezy equation, the water loses its oxygen supply, varied habitats are replaced by a sterile channel, and without meandering pools and riffles, the river loses its protection from dry season and accelerated flows. Ultimately, the water always tries to break out of its artificial confinement, resulting in flooding, expensive channel maintenance, and other damages (Newbury and Gaboury 1993).

Multiple account analysis

Together the two basic principles that human activities must be contained within the natural capacity, and human processes have to follow natural processes, lay a solid foundation for environmental planning and management. The next challenge is to translate these principles into a framework through which policy and projects can be analyzed. One

such framework is the multiple account method . Designed to allow consideration of factors that go beyond economic rationales, multiple accounts can effectively integrate social and environmental concerns into an otherwise economic decision-making process. The multiple account framework is relatively simple. Noneconomic considerations such as social and environmental are identified. These are listed alongside traditional economic evaluation indicators such as cost efficiency and net present value. Depending on the indicator, the evaluation can be either quantitative or qualitative. A sample multiple account evaluation form might look something like this:

Table 9 Multiple Account Project or Policy Evaluation

Account	Project or Policy	Alternative A	Alternative B
Economic			
Employment			
Net Present Value			
Cost efficiency			
Social			
Dislocation			
Youth			
Gender			
Environment			
Wildlife			
Resource Stock			
Watershed			

The multiple account framework has many strengths. Most important is its flexibility. The indicators are open ended and can be easily tailored according to a local situation. Secondly, it can be relatively easily integrated into the current economic decision-making process while providing a vehicle for social and environmental concerns. Finally, the

multiple account method provides a framework for public input at both agenda and evaluation levels (British Columbia Crown Corporations Secretariat 1993).

Regional potential analysis and participatory rural appraisal

That said, the multiple account framework is best suited to evaluation of individual projects or policy. The environmental challenge in Lijiang is often cross policy in nature in the sense that the sustainability of one policy can only be analyzed within an interactive framework that includes other policies. One environmental planning and management framework that can meet such challenge is Regional Potential Analysis, or RPA. Based on a biophysical method known as Regional Development Environmental Impact Assessment developed by James, Ballard, and Devine (1985), I have integrated elements of other planning tools to provide an integrated regional approach to sustainability evaluation beyond traditional sectoral and jurisdictional boundaries. RPA contains three distinctive steps.

The first step is to establish a regional profile on major environmental, social, and economic trends and to identify the driving forces behind such trends. A crucial difference from conventional inventory and baseline analysis is that RPA emphasizes historical trends. Examples of step one analysis might include historical change in the size of the regional economy, whether the change is driven by hydroelectric development, mining, or other identifiable factors, trends in human settlement patterns, or water availability and quality-related trends.

Once the major trends and driving forces are identified, the next challenge is to analyze and establish relations and interactions between and among them. Examples at this stage might be relations between economic activities and environmental degradation, and the interplay of historical trends in economic sectoral change and human settlement patterns. The goal of this analysis is to construct an interactive, dynamic model that adequately explains historical trends.

The final step is to run policy and project options through the model and analyze possible impacts and outcomes. At this stage, it becomes possible to do meaningful analysis as to how a policy or project is going to impact regional environmental, social and economic potentials, whether an impact will be positive or negative, and whether an impact will be irreversible.

The biggest challenge for RPA is that it is extremely complex and involves demanding requirements for historical data, research, expertise, and data analysis. It is unrealistic to expect the Bureau of Environmental Protection, even with appropriate institutional goals, mandate, and support, to perform such functions in the foreseeable future. My intention in developing this framework is that it be used in conjunction with Participatory Rural Appraisal, or PRA. While RPA through PRA is a catchy phrase, the real reason for the combination is that PRA perfectly compliments RPA's demand for quality data and data analysis that are sensitive to historical, cultural, environmental, economic, and institutional contexts.

PRA is a participatory method designed to give local community members a tool to take control over research agendas, data collection, and data analysis. Reacting to interventionist development approaches, PRA strives to restore an autonomous conceptual space through which people can define development on their own terms. In a typical PRA setting, the agenda, analytical framework, data collection, data analysis, and problem solving are entirely driven by the community. Gathered in groups and drawing on the ground, a blackboard, a piece of paper, or whatever, the process often starts with an inventory of social, economic, and environmental resources, relations, or processes. This includes who lives where, where they farm, what they plant, which institutions have greater or lesser impact on their lives, to name just a few possibilities. During the course of this collective inventory, issues emerge, which in turn, dictate the next stage of action. As the process proceeds, locals draw upon their lifetime knowledge and observations and produce a useful database of

comparisons and analysis. The research is then summarized by local participants themselves in support of local solutions and actions.

Given the RPA's focus on historical data, its sensitivity to relations and interactions and the Naxi's rich tradition in ecological knowledge and environmental management, it is only logical that the analysis be driven by local community members through PRA. While so far, PRA is mostly applied at community level, a regionally focused RPA would challenge communities to collaborate on their research and analysis.

Summary

There are two layers of environmental planning and management in Lijiang. At community level, the Naxi have a long historical tradition of environmental planning and management. Striving to live harmoniously with their natural environment and facilitated by centuries of intergenerational teaching and close observation of nature, the Naxi's approach to environmental planning and management is visible from both their legends and the way they construct their community life. There is, however, another level of environmental planning and management. Symbolized by the Bureau of Environmental Protection, this is the institutional level of environmental planning and management, which in turn, is only one part of a larger institutional structure making decisions driven by a reductionist economic logic. On the one hand, Lijiang faces major economic development choices, and the need for integrated environmental planning and management is more urgent than ever. On the other hand, the existing system is plagued by problems such as narrowly defined goals, inadequate mandate, and general lack of institutional support. The logical solution is to bridge the two levels of management and bring Naxi communities into a process to which they have much to contribute and from which they have been excluded.

Conclusion

What conclusions can we draw about the sustainability of the environmental and natural resource management regime in Lijiang after repeated research visits and analysis of key sectors, institutions, and policies within an interactive social, economic, and environmental context? Given the complexity of the relations and interactions, the answer has to be divided into two parts. The first approach is to take a snapshot in time, and the second is to put the snapshot into context taking into consideration dynamic, historical socio-economic and institutional trends. As we shall see, each approach offers significant insights and different perspectives on the sustainability question. Together, they form two complementary pieces of the puzzle, and a whole picture starts to emerge that points to a desirable direction for the future.

With some important caveats, the snapshot approach clearly puts Lijiang in a very favorable light in terms of sustainable use of natural resources within a given environmental capacity. Given the sustainability criteria set out in the introduction, Lijiang either consistently scores positively, or problems are contained and do not yet seriously challenge the overall assessment. We will follow the same sequence whereby the criteria were laid out in the introduction and briefly revisit them in the context of Lijiang's performance.

- There is ample evidence, both physical and documentary, that the Naxi consider environmental, social, and economic sustainability as interactive and interrelated. This conclusion can be drawn from the way that Naxi approach land use planning. Human settlements and activities are clearly designed to facilitate and protect ecological processes, the health of which, in turn, provides a fertile basis for long-term productivity and well-being.
- Analysis shows that the Naxi explicitly consider environmental and social factors when making decisions about economic activities. Some of the decisions are routine

ones that are made on a monthly or annual basis. Examples include what to plant and where to plant. Other decisions are extremely long term, and as such, not always obvious to causal observers. Examples in this category might include where to build villages and how to use and manage water. Sometimes, the integration of social and environmental concerns into economic decision making is self-evident from local teaching and legends. Other times, this environmental sensitivity is internalized and only evident through careful observations. Acknowledging that there is a completely different layer of economic decision making at the county government level which often demonstrates extreme insensitivity to environmental and social considerations, it does not yet have enough momentum to successfully challenge, dislocate, or replace traditional Naxi decision-making mechanisms. The two most prominent projects in this category are hydroelectric power and tourism. At the time of writing, the hydroelectric power project is still in the planning stage with no guarantee of success, while tourism is also in an early stage of development.

- Institutionalized public participation in economic development is yet to emerge in Lijiang. However, this weakness is not yet a flaw critical enough to reverse our sustainability evaluation because traditional activities, economic or otherwise, still dominate the local economic and social processes. In other words, imposed economic development projects have not accumulated enough of a critical mass to make public participation a concern that overrides other criteria in our sustainability evaluation.
- From the brothers of Shu and Gu, and their agreement of four principles to traditionally organic and integrated approach to agriculture, Naxi traditional uses of renewable natural resources consistently demonstrate long-term consideration for regeneration capacity and future generations. There is also an encouraging trend at the county level to rebuild the forest cover to its historical high of 70%—a significant

achievement because forests are arguably the most important renewable resource in Lijiang.

- The most eloquent demonstration of how Naxi manage and contain human activities within the natural capacity of the environment is the very health and productivity of the land and ecosystems. Key to this balance of social, economic, and environmental sustainability is the self-sufficient lifestyle and self-regulatory mechanisms that allow greater transparency between interactions and impacts. This is in direct contrast to communities highly integrated into the national and global economic system where impacts and interactions are largely mediated through markets and technology, and where feedbacks are often delayed, distorted, and dislocated. Although the Naxi approach to land use within the context of self-sufficiency and self-regulation is under pressure to change, the damage is mostly contained and not yet irreversible.
- Institutional redesign based on sustainable principles is a big challenge facing environmental and resource management institutions in Lijiang. As the history of agricultural policy towards modernization demonstrates, the problematic institutional process in Lijiang is often ineffective in pushing the modernization agenda due to lack of local needs, support and necessary infrastructure.

Given these observations and analysis, the overall assessment based on a snapshot approach is that the use of natural resources within the given environmental capacity in Lijiang is sustainable. This statement gains considerably more weight when we compare Lijiang to countries and regions highly developed and integrated into the global market economy. However, Lijiang is anything but a snapshot. Given national and local policy and institutional trends, can we still draw the same sustainability conclusion about long-term prospects in Lijiang? The answer to the second question is much more complex and elusive.

We have covered much analysis of policy and institutional trends that violate sustainability principles. Development projects at the institutional level are typically driven

by a narrow economic reasoning process. Local control, or the lack of it, in nationally and provincially driven projects and outside investment is a critical issue. Institutional processes are typically hierarchical and exclude the public. The list goes on. Although each of the flaws, as demonstrated in the foregoing snapshot analysis, does not yet appear to challenge the overall balance between social, economic, and environmental sustainability at the present time, the institutional trend towards narrowly focused economic reasoning that excludes social and environmental concerns is unmistakable. The critical question is whether the trend will accelerate. If it does, it would not be long before it seriously challenges, damages, and dislocates community-based traditional decisions, activities, and processes. Whether the trend will accelerate, in turn, depends on the effectiveness of the modernization policy to push Lijiang into an imposed, top-down, outside investment-oriented development model. The key factors to watch are how the hydroelectric power and tourism projects play out.

Ultimately, the effectiveness of modernization policy in dislocating and replacing traditional community based decisions and activities will depend on the development of modern infrastructure. This modern infrastructure includes tangible assets such as roads, electricity, and telecommunication networks but also access to markets, financial services, legal protection of property and contracts, and integration into the national and international economic system. Despite a favorable policy framework, and some initial investment both locally and provincially, such infrastructure is still limited in Lijiang. On the other hand, a modern infrastructure will not survive if it is not sustained by sufficient revenue-generating commercial activity. In other words, although the government can devise favorable policy and invest in infrastructure, such infrastructure cannot be sustained if the amount of commercial use cannot create critical economies of scale to pay for its maintenance and development. This is why the hydroelectric power and tourism projects are so critical, because they are the only feasible undertakings, at the time of writing, that can potentially generate enough commercial activity to sustain the existing limited infrastructure, give it

momentum, and propel it into a complete network. However, construction of such a synergy of modern infrastructure and commercial activity within a limited policy and hierarchical institutional context, driven by a reductionist economic logic would have very serious sustainability implications.

Are the hydroelectric power and tourism projects going to succeed? The hydroelectric power project is a wild card driven by elusive national and international political and economic factors beyond local control. The tourism project, which has been quickly gaining momentum until now, is suffering from the economic downturn in southeast Asia. I have neither the intention nor the analytical basis to speculate on the future of the two projects—whether they will succeed, under what circumstances, at what scale, and so forth. Speculation of this kind would have to come from another study. For the purpose of this study, however, it is adequate to conclude that given the policy and institutional contexts and current trends in Lijiang, successful development of modern infrastructure supporting, and supported by, the catalyst of hydroelectric power megaprojects and tourism, would lead Lijiang towards an unsustainable development model.

At this stage, the analysis leads us towards a dichotomy of two opposing forces and scenarios. On the one hand, there is the Naxi and their sustainable traditional approach to environmental and natural resource management. To maintain this traditional system, self-sufficiency and self-regulation are the key factors. On the other hand, there is the modernization policy and hierarchical institutional process aimed at changing and replacing the traditional structure with modern infrastructure and commercial activities. In this kind of dichotomy, it is easy to draw an either-or conclusion—either Lijiang maintains, restores, and promotes its time-honored traditional system, or destroys and displaces it with modern infrastructure and commercial activities. It is equally tempting to draw a conclusion that the former is sustainable and the latter is not. Indeed, this dichotomy to a large extent mirrors my adventure into the paradigms of resource management and radical critique of

development discourse. Can we successfully negotiate and reconcile elements from each paradigm towards an alternative framework? This is the task I set for myself at the introduction, and I believe that my analysis shows that we can.

The basis for my positive answer is the consistent convergence between cutting edge ecosystem-based resource management principles and traditional approaches to resource use and management. Although I only explicitly referred to ecosystem-based environmental and natural resource management in Chapter 2 on forestry, the framework and principles are not limited to forestry and provide a reference point throughout this research project. The essence of ecosystem principles is elegantly simple and intuitive—environment and natural resources should be managed according to nature's logic, and by extension, not by narrow reductionist market principles.

The development of ecosystem principles is driven by natural scientists, their methods are scientific and technological, and they come from a wide range of scientific disciplines. The driving force behind this movement is the critique of the manipulative, insensitive, and antienvironmental tendencies in the historical development and application of science and technology, an argument clearly presented by Mumford and McHarg. Although the evolution of scientific methodology in this movement is highly complex and differs from field to field, two general observations can be made. They all rely upon two powerful tendencies in modern science and technology: the power and capacity to systematically observe and to simulate natural and organic processes.

Taking ecosystem-based water management principles as an example, the consensus among ecosystem scientists around the natural processes of water is based literally on hundreds of thousands of observations, measurements, and calculations of natural water ways large and small around the world. Once the data are painstakingly assembled, consensus around water flow patterns and processes start to emerge. These patterns and processes can

then be applied to simulate natural processes. Indeed, this is the scientific basis for water channel renaturalization projects in BC and around the world (Dunne and Leopold 1978).

Throughout my research project, we also talked about the Naxi traditional approach to environmental and resource management. When we compare Naxi traditional knowledge and practice with those of ecosystem-based management, a revelation starts to emerge. Despite their completely different historical paths, discourses, and methodologies, the two have come to a point of convergence. This convergence, in turn, points to an exciting possibility that they could be mutually compatible and supportive. Each is complementary to the other. Traditional knowledge is fine tuned to local ecology and, as such, extremely sensitive to local environmental needs and capacities and how human activities can be best contained. Modern science and technology, on the other hand, are based on powerful complementary observational and simulative tools that could provide access to such tools and to regional, national, and international networks to local communities that could bring traditional knowledge to an unprecedented level of sophistication and influence.

I now draw upon an existing analytical framework to support my claim. The framework is Shoshana Zuboff's analysis of the parallel informating and automating tendency in computer technology. Zuboff, a Harvard social scientist, observed that computer technology can be used to support two opposing functions—to informate and to automate. What the computer technology does is to monitor, collect and store data in a capacity and speed unfathomable before. Typically, this capability is applied to replace human control and creativity and centralize the control function in the hands of management while providing management with instant monitoring of employees' work in every imaginable detail. Working mostly with data and case studies in the United States, Zuboff pointed out that while this trend towards displacement of employee control and creativity through computerized automation dominates the business world, there are also significant examples of using computer technology's "informating" capacity to empower workers. Instead of

removing judgment, creativity, and control from workers, the same computer capacity to monitor, collect, and store data can be used to provide employees with access to data and analytical tools that would not be possible otherwise. A worker from a plant where the "informating" tendency in computer technology was used in this way commented during an interview:

> Having access to so much information makes you think ahead. There are always some problems that you have no control over, but many problems can be avoided if you are just monitoring the information, concentrating on it, thinking about it, understanding what it means, seeing the patterns in it, and being alert to the things it is showing you. Once you gain confidence with the new technology, you have time to think about how to do the job better and how things could be done differently. That is the real potential of this (computerized) equipment. That could never have occurred if we had just stayed with the old technology. (Zuboff 1988, 302)

Zuboff went on to argue that this new sense of empowerment and creative challenge is essential to employee commitment, morale, and ultimately corporate profitability. What is important to my analysis are the critical conclusions that neither the automating nor the informating tendency can be described as inevitable or inherent in computer technology; which tendency dominates will depend on the social and institutional context within which the technology is designed and implemented; and that computerization is at a stage of technological development that could be compatible with, and supportive of, human creativity (Zuboff 1988).

Putting the convergence between ecosystem principles and traditional approaches to environmental and resource management in Lijiang into the Zuboff framework, we can make two important conclusions. The ability to observe and simulate organic processes within modern science and technology in support of ecosystem principles not only is fully compatible with traditional knowledge and practice, but also has the potential to bring them to a more effective level of articulation through empowerment of communities. Based on the same analysis, we could also conclude that the manipulative, reductionist, and destructive

tendencies in science and technology that Shiva and others describe is not intrinsic to modern science and technology as such. Instead, they are the product of the particular socio-economic context within which science and technology are designed and implemented. To what extent the organic, informating, and creative potentials in modern science and technology can be realized will depend on the emergence of an alternative policy and institutional context within which such potentials are actively explored, experimented with, and implemented.[27]

Clearly, the proposition of developing an alternative socio-economic framework within which the organic, informating, and creative potentials in modern science and technology can be fully explored necessarily rejects the reductionist choice of one paradigm over the other. What such an alternative framework would look like, and how it would be manifested through alternative policy and institutional designs, cannot be answered without further studies. That said, the road map laid out in this research project give us more than glimpses into aspects of it. It would certainly include: creating institutional and conceptual autonomous spaces within which communities could define development and modernization on their own terms; organizing networks in support of peripheral activities to facilitate paradigm changes; moving environmental and resource management towards an alternative framework such as the RPA through PRA approaches; and balancing impersonal cultural orientation with relational ones.

What recommendations can we make for moving policy and institutional processes towards an alternative socio-economic paradigm? Although this is an exceedingly complex and interactive challenge, the analysis and conclusions we have drawn so far clearly indicate some general directions for immediate action.

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[27]For a framework within which the convergence theory and the organic tendency in modern science and technology in the field of environmental and resource management could be explored, read Daniel Botkin *Discordant Harmonies.*

The most urgent task is to open up the discussion among people in Lijiang about Lijiang's past, where it is now, and where its citizens wish to go with the choices available. Policy, sustainability, development, environmental and resource management, and institutional arrangements should be determined within this larger context. The goal should be to return control to communities over how they wish to define modernization, infrastructure, and development, and encourage the emergence of a network that fosters and promotes the integration of traditional knowledge, regional perspectives, responsible use, and environmental sensitivity. It is conceivable that this kind of discussion and networking could develop into an association of communities, both nationally and internationally, that transcends the self-sufficiency-self-regulation vs. market integration-centralized control dichotomy .

Equally urgent is the need to actively collect, record, and promote traditional knowledge. Much of this knowledge resides with Naxi elders. The documentary evidence is highly scattered. Physical evidence such as traditional land use planning and human settlement design also needs to be systematically recorded. Once collected and recorded, traditional knowledge and practice could be systematically integrated into the existing environmental and resource management functions.

Short-, medium- and long-term environmental planning in Lijiang, or the lack of it, is yet another urgent action item. On the surface, the probability of completing this monumental task seems to be highly constrained by the lack of financial resources and technical expertise, as our analysis of environmental management under the Bureau of Environmental Protection clearly demonstrates. This weakness, however, could be more than compensated for by returning to the rich Naxi environmental planning tradition and developing an alternative institutional process to the heavy-handed, hierarchical regulations that exclude locals and local uses. RPA through PRA provide one framework for action-oriented research to encourage such a reversal.

Meanwhile, risk management and caution should dictate the economic development process in Lijiang. The biggest asset for Lijiang is its rich natural and cultural heritage in all its glorious diversity. Impacts on this unique asset should be carefully analyzed and managed. When complexity rules, extreme caution should be exercised to avoid irrevocable damage.

If my last thoughts on the future sustainable prospect for Lijiang remain cautiously positive, it is because I have witnessed a remarkable cultural resilience through my interactions with the Naxi in the last seven years. In Mandarin, the word crisis can also be translated as opportunities—a linguistic reflection of the Taoist philosophy on the relationship between order and chaos. Challenges to Naxi cultural and natural heritage have not been limited to modern times, and time and again, the Naxi have demonstrated a unique capacity to turn crisis into opportunities and to contain changes on their own terms. Whether this provides sufficient ground for optimism will be revealed within the next decade or so. The recognition of a crisis, however, is a necessary precondition to the creation of opportunities.

Appendix A

The People's Republic of China Environmental Protection Act

People's Representative Congress Standing Committee

December 26, 1989

Chapter One: General Principles

Clause 1. The purpose of the *Act* is to protect and improve social and biophysical environment, prevent and manage pollution and other public harm, safeguard public health, and promote the development of socialist modern construction.

Clause 2. "Environment" referred to in the *Act* includes the entirety of natural and modified environmental elements which affect human survival and development. Examples include atmosphere, water, oceans, lands, mineral deposit, forests, meadow, wildlife, natural historical sites, human historical sites, nature reserves, beautiful scenery, cities, and villages.

Clause 3. The *Act* is applicable to the territory of the People's Republic of China as well as oceans under the jurisdiction of the People's Republic of China.

Clause 4. Environmental plans compiled by the national government must be incorporated into national economic and social development plans. The national government adopts economic and technological policy and measures which are favorable to environmental protection, and balance environmental protection with economic construction and social development.

Clause 5. The national government encourages the development of environmental protection science and education, the enhancement of environmental protection scientific research and development, the promotion of environmental protection science and technology, and the popularization of environmental protection knowledge.

Clause 6. Every unit and individual has the obligation to protect the environment, and the right to report on and sue units and individuals who are polluting and damaging the environment.

Clause 7. The State Department Environmental Protection Administration Authority manages and supervises the national environmental protection activities.

The environmental protection administration authorities at the county government level or above manage and supervise the environmental protection activities within their jurisdictions.

The national authority in charge of oceans, harbors, and fisheries, the military environmental protection authority, and public security, transportation, railway, and civil aviation authorities at all levels manage and supervise environmental pollution prevention according to relevant legislation.

Government agencies in charge of land, mineral deposit, forestry, agriculture, and hydroelectric power at the county level or above manage and supervise natural resource protection according to relevant legislation.

Clause 8. Governments reward units and individuals with outstanding contributions to environmental protection and improvement.

Chapter Two: Environmental Management and Monitoring

Clause 9. The State Department Environmental Protection Administration Authority establishes national environmental quality standards.

Provinces, Autonomous Regions, and Municipalities may establish local environmental quality standards in areas not covered by national standards. Local environmental quality standards are registered with the State Department Environmental Protection Administration Authority.

Clause 10. The State Department Environmental Protection Administration Authority establishes national pollutant discharge standards according to the national environmental quality standards, and national economic and technological conditions.

Provinces, Autonomous Regions, and Municipalities may establish local pollutant discharge standards in areas not covered by national standards. They also may set up standards more strict than national pollutant discharge standards in areas already covered by national standards. Local pollutant discharge standards are registered with the State Department Environmental Protection Administration Authority.

Local pollutant discharge standards should be followed where they exist.

Clause 11. The environmental protection administration authority under the state department develops a monitoring system, establishes a monitoring protocol, coordinate with relevant agencies in organizing the monitoring network, and enhances the management of environmental monitoring.

Environmental protection authorities from the state department, provinces, autonomous regions, and municipalities should periodically issue state of environment reports.

Clause 12. In coordination with relevant agencies, environmental protection authorities at the county government level or above should conduct investigation and evaluation of the environment within their jurisdictions, compile environmental protection plans which could be approved by the government after the plans are balanced and integrated by planning commissions.

Clause 13. Polluting construction projects must observe relevant regulations set out in the national legislation on construction projects.

The ConstructionProjectEnvironmental Impact Report must evaluate environmental impacts and pollutant discharges pertaining to a construction project, and propose mitigation

measures. The report is preapproved by the responsible authority before referring to the environmental protection authority for approval according to procedures.

Clause 14. Environmental protection authorities at the county government level or above and other administrative authorities empowered by the *Act* to exercise environmental management responsibilities have the right to conduct on-site-auditswithin their jurisdiction. Organizations being audited must provide accurate information. The auditing authority must protect technical and trade secrets of the organization investigated.

Clause 15. Relevant governments can negotiate solutions regarding transjurisdiction environmental pollution and damage. Otherwise, arbitration and mediation could be exercised by superior governments.

Chapter Three: Environmental Protection and Improvement

Clause 16. Local governments at all levels should take responsibility for environmental quality within their jurisdiction, and adopt measures to improve environmental quality.

Clause 17. Local governments at all levels should adopt measures to protect and to prevent the destruction of typical ecosystems. These include: areas with rare or endangered species, important watersheds, natural sites with significant scientific value such as geological features, caves, fossils, glaciers, volcanos and hot springs, historical human sites, and ancient trees.

Clause 18. No environmentally polluting industrial construction is allowed within unique areas including spectacular scenery, nature reserves, and other specially protected areas established by the state department, authorities under the state department, provinces, autonomous regions, and municipalities. Projects and construction cannot exceed pollutant discharge standards. Regarding existing facilities where effluent exceeds standards, a work plan and time line should be established to bring the effluent into compliance with standards.

Clause 19. Ecosystems must be protected when developing and extracting natural resources.

Clause 20. Local governments at all levels may enhance agricultural environmental protection. This is to be achieved by preventing soil contamination, desertification, salinity, loss of nutrients, water saturation, surface subsidence, loss of vegetation cover, soil erosion, drying of water source, species extinction, or the development of other ecological imbalances; and promote comprehensive treatment of disease and pests, rational use of chemical fertilizers, pesticides, and growth stimulants.

Clause 21. The state department and local coastal governments should enhance environmental protection of oceans. To prevent pollution and damage to the ocean environment, pollutant discharge into the ocean, disposal of solid waste, coastal project construction, and offshore oil exploration and extraction must comply with existing legislation and regulations.

Clause 22. When formulating urban plans, environmental protection and improvement goals and tasks should be clearly established.

Clause 23. Urban and rural development should protect vegetation cover, water, and natural scenery according to local environmental characteristics, and enhance development of urban parks, green space, and unique landscapes.

Chapter Four: Prevention of Environmental Pollution and Other Forms of Degradation

Clause 24. Organizations that produce pollutants and other forms of environmental degradation must incorporate environmental protection into production plans and establish an environmental protection responsibility system. They must also prevent the release or escapement of byproducts into the environment by: adopting effective measures to prevent gas waste, water waste, solid waste, dust, strong unpleasant odors, radioactive material,

noise, vibrations, and electronic magnetic fields from being released during production or other activities.

Clause 25. When conducting technological renovations, new and existing industrial enterprises should adopt equipment and processes that have high resource use efficiency and low discharge pollutants. Economic and reasonable methods should be used to recycle discarded materials and treat pollutants.

Clause 26. Facilities to process pollutants must be designed, constructed, and started as part of a main production facility. Production can only begin after a pollutant processing facility outlined in an environmental impact report is deemed to be completed by the environmental protection authority that originally approved the report.

A pollutant processing facility cannot be arbitrarily dismantled or left idle. If there is a demonstrable need to dismantle or shut down a pollutant processing facility, the action must be pre-approved by a local environmental protection authority.

Clause 27. Industrial and nonindustrial organizations which discharge pollutants must register as per regulations established by the State Department Environmental Protection Administration Authority.

Clause 28. Industrial and nonindustrial organizations discharging pollutants above the national or local standards must pay a fine as per national regulations, and they are responsible for taking corrective measures. Water pollution is governed by separate regulations.

Collected pollutant fines must be applied to pollution abatement. They cannot be used for other purposes. Details regarding how this principle should be applied will be issued by the State Department in a separate regulation.

Clause 29. Severely polluting industrial and nonindustrial organizations are given a deadline to adopt corrective measures.

Appropriate remedial actions and associated implementation deadlines apply to industrial and nonindustrial organizations that report directly to central, provincial, autonomous regional, and municipal governments are determined by central, provincial, autonomous regional, and municipal governments respectively. Corrective measures with deadlines applying to industrial and nonindustrial organizations that report directly to governments at or below the county level are determined by the county government. Organizations ordered to clean up pollution sources must comply within the deadlines established.

Clause 30. It is forbidden to important technology and equipment that do not meet the national environmental protection requirements.

Clause 31. If an organization causes, or has the potential to cause, pollution because of an accident or other unforeseeable events, it must adopt immediate measures while notifying organizations and residents who might be affected. Meanwhile, it must report to the local environmental protection and other relevant authorities, and accept investigation and assessed penalties.

Industrial and nonindustrial organizations with the potential to cause significant accidental pollution should take preventative measures.

Clause 32. Environmental protection authorities at the county level, or above, must report any significant environmental pollution that threatens lives and properties of local residents to a county government, who must adopt effective measures to eliminate or alleviate damages.

Clause 33. The production, storage, transportation, sale, and use of toxic chemical and radioactive materials must follow the relevant national regulations to prevent environmental pollution.

Clause 34. No organization can transfer production equipment which generates significant pollution to another organization that does not have any pollutant processing facilities.

Chapter Five: Legal Liability

Clause 35. According to the situation, an environmental protection authority or other authorities with legislated power to exercise environmental management responsibilities, may issue a warning or a financial penalty to anyone who has conducted any one of the following violations under the *Act*.

1. Refusal to accept on a site audit by environmental protection authorities or other organizations with legislated power to exercise environmental supervision, or provide false information while being audited.
2. Refusal to provide information, or provide false information, on a pollutant discharge report required as per regulations by the State Department Environmental Protection Administrative Authority.
3. Failure to observe the national regulation on payment of pollution fines.
4. Import technology and equipment which do not conform to the national environmental protection standards.
5. Transfer significantly polluting production equipment to organizations which do not have adequate pollution processing capacity.

Clause 36. An environmental protection authority which approved an environmental impact report on a project may order the project to stop work if it fails to complete the pollutant processing component, or if the facility does not meet the national emission standard.

Clause 37. When an organization unilaterally dismantles or shuts down a pollutant processing facility without approval, and the discharge of pollutants exceeds standards as result, an environmental protection authority may order the organization to reinstall the facility and apply an appropriate financial penalty.

Clause 38. When an industrial or nonindustrial organization causes an environment polluting accident due to violation of the *Act*, an environmental protection authority, or other

organizations with legislative power to exercise environmental supervision may apply an appropriate financial penalty, depending on the severity of impact. If the impact is significant, the responsible person(s) may be reprimanded by leaders from the same organization or superior government agencies.

Clause 39. When an organization fails to complete corrective measures according to a stipulated work plan and deadline, it may be ordered to stop or close the business while being charged a pollution fine according to the severity of impact experienced.

The financial penalty described in the previous clause is determined by environmental protection authorities. The order to stop or close is determined by the government who issued the corrective work plan and deadline in the first place. Any orders of stoppage or closure pertaining to industrial and nonindustrial organizations who report directly to the central government must be approved by the State Department.

Clause 40. If an offender disagrees with an reprimand, it may within 15 days of receiving the decision appeal to the organization one level senior to the organization which issued the decision. If an offender disagrees with the appeal decision, it may within 15 days upon receiving such a verdict, appeal the decision to a court. When an offender refuses to comply with a penalty without pursuing appealing or court action, the organization which issued the penalty may ask the court to enforce the decision by force if necessary.

Clause 41. Organizations which cause environmental pollution are liable to reverse or correct the negative impacts and compensate organizations or individuals affected.

Disputes over a compensation penalty and amount may, at the party's request, be resolved by environmental protection authorities or other organizations with legislative power to exercise environmental supervision. If the parties disagree with the decision, they may appeal to a court. Party may also directly ask the court for a solution.

An organization is released from responsibilities if an impact is due to natural disasters and cannot be avoided despite adoption of timely measures.

Clause 42. Affected parties have three years to seek environmental pollution damage compensation through legal actions. The date is calculated from the time when the affected know, or should know, about the damage.

Clause 43. Criminal charges may be applied to person(s) directly responsible for significant environmental pollution accidents which result in severe public and private property damage or loss of human lives due to violation of the *Act*.

Clause 44. Legal charges may be applied according to relevant legislation to any actions in violation of the *Act* which results in damages to land, forest, grassland, water, mineral, fishery, wildlife, vegetation, or other natural resources.

Clause 45. Environmental protection officials who abuse power, take responsibilities lightly and accept bribery may be reprimanded by leaders of the same or senior organizations. Criminal charges may be applied if an action is criminal in nature.

Chapter Six: Supplementary Principles

Clause 46. If discrepancies exist between national legislation and international agreements of which the People's Republic of China is a signing member, the international agreement has paramountcy, with the exception of not withstanding clauses declared by the People's Republic of China.

Clause 47. The *Act* replaces the draft *People's Republic of China Environmental Protection Act*.

Appendix B

Yunnan Province Lijiang Naxi Autonomous County Forest Management Regulation

Lijiang Naxi Autonomous County People's Representative Congress

Standing Committee

June 1, 1993

Chapter One: General Principles

Clause 1. According to *People's Republic of China Minority Area Autonomous Administration Act*, *Forest Act*, *Yunnan Province Forest Act and Implementation Guideline*, and *Yunnan Province Lijiang Naxi Autonomous County Administration Regulation*, and based on the local situation of the county, the regulation is compiled for a variety of reasons. These are: to enhance forest management, to effectively protect and rationally use forest resources, to accelerate reforestation, to fully utilize multiple benefits from forests, and to accelerate economic development.

Clause 2. Forestry is an important resource to the autonomous county. Tree planting through mobilization of society should be encouraged. Reforestation is the foundation for developing a forest sector. Forest protection and reforestation are everyone's responsibility. Sustainable harvesting based on planting is the strategy for developing the forest sector, which is guided by the principle of balancing among ecological, economic, and social benefits.

Clause 3. The forest within the autonomous county is managed by forest management authority of the autonomous county people's government.

Clause 4. Forest education, scientific research, and technology are promoted. A scientific management system based on mutual support between science and technology, production, planning, and finance is practiced.

Clause 5. The regulation is applicable to any organizations and individuals engaging in forest activities within the autonomous county.

Chapter Two: Reforestation and Tree Planting

Clause 6. Governments at all levels should widely conduct reforestation and tree planting education during the annual national tree planting festival and the Yunnan Province tree planting month. Tree planting responsibilitiesshould be properly organized and managed and taken seriously according to plans.

Model tree farms should be established by county, township, town, and village governments as examples for tree planting and reforestation.

Clause 7. Tree planting and reforestation are responsibilities of the state, collectives, and individuals. Collective and individual tree planting and reforestation are encouraged and supported. Trees belong to a collective and individuals who planted them. Ownership is long term, does not change with time, and it can be inherited and transferred.

County, townships, villages, and plantations may import technology, capital, and expertise to develop trees with high economic or timber values within planned areas. The autonomous county government provides land and other favorable conditions to encourage planting protective trees, trees for fuel, and trees for specialized uses.

Clause 8. Tree planting and reforestation are conducted according to predesigned technological standards and procedures. Tree planting projects are supplemented by other popular activities. An inspection system is established. Tree planting with a survival rate lower than 85% cannot be included in the total annual reforestation target.

Priority for forest sector development, forest byproduct development, reforestation, and forest product development is given to mountainous and poor areas.

Clause 9. New harvesting quotas will not be given to those who do not fulfill the reforestation obligation of their harvesting contract. A deadline will be issued within which the reforestation obligation must be fulfilled.

Clause 10. Tree planting in rural areas is based on a system of volunteer labor supplemented by paid labor. Volunteer labor is applied towards legal tree planting requirements, while paid labor may receive a portion of distributed profits.

A registration card is issued to each citizen for obligatory tree planting. Those who do not fulfill their tree planting obligations must either pay a green fee to a reforestation committee as per regulation's or fulfill their obligations within new deadlines.

Planting commemorative trees is encouraged and promoted. Commemorative tree patches may be established.

Clause 11. Protective trees are planted around farm fields according to plans. Water retaining trees, dike protection trees, river bank protection trees, and road protection trees are planted on river banks, around reservoirs, and along roads.

Clause 12. Idle mountains, lands, and empty urban and rural spaces owned by the state or collectives should be reforested within the deadline stipulated by the local government.

A tree planting component must be designed into new urban and rural construction projects. When organizing production, or when a production shift is over, enterprises should engage in reforestation, tree planting, and protect environment.

Clause 13. Tree planting must follow standard technical procedures. Scientific tree planting is practiced to guarantee survival. The forest and forest byproduct industries should be developed. Trees of high economic values, trees that grow rapidly, trees of high timber values, protective trees, trees for fuel, and water source protection trees are developed systematically according to plans.

Collectives and individuals are encouraged to plant trees for timber, protective trees, trees for fuel and trees of high economic values while developing farms, family tree farms,

and orchards. Party organizations, governments, schools, and civil organizations should landscape their courtyards. Organizations with favorable economic, growing, and other conditions are encouraged to engage in green enterprises.

Once a year the county people's government conducts a tree planting inspection to confirm planting area sizes and survival rate.

Chapter Three: Resource Protection

Clause 14. Forest resources within the county are subjected to the following protective measures:

1. Allowable cut is managed centrally. Total allowable cut is tightly controlled based on the principle that the timber consumption quantity should be lower than the growing capacity. Tree planting and reforestation are actively encouraged. Access to mountains may be restricted to allow regeneration.
2. Organizations and residents living in forested areas should develop fuel saving, energy saving alternatives. Serious efforts should be made to minimize using trees as fuel and under all circumstances to use quality trees as fuel.
3. Coal, paper, transportation, agriculture, hydroelectricity, urban construction, and other organizations should set aside a special fund for tree planting and reforestation.
4. Rare and precious wildlife are specially protected.

Clause 15. County and township governments should include tree planting, reforestation, forest management, fire prevention, disease prevention, harvesting, and timber operations in their regular agendas. Conflict over forest ownership should be dealt with in a timely manner to prevent abusive harvesting, clearing forests for farming, and other destructive activities.

Clause 16. County and township governments should established forest fire prevention organizations with assigned forest fire prevention responsibility areas. Township and town governments and forest administration authorities should sign forest fire prevention contracts with the county people's government. Forest fire prevention should be part of the objectives under the responsibility system.

The forest fire prevention season lasts from November to the following June. The period between February and May is considered especially prone to forest fire. During this period, outdoor fires are not allowed. Watch towers equipped with means of transportation, communication facilities, and fire fighting equipment should be established in important forest areas.

Townships and villages should establish and improve forest protection regulations with specialized forest protection workers. During the fire prevention period, townships and villages located within important forest areas should organize forest patrols. Collectively owned forests should have specialized forest protection workers and fire fighting teams with the militia as core members.

Fire fighting should focus on prevention and fire fighting at the earliest possible stage. The principle of early and thorough fire fighting at the earliest possible stage of fire should be followed. During the fire prevention period, forest fire fighting teams and forest protection staff should reinforce patrol and monitoring activities.

Forest fires should be immediately reported to senior governments and effective measures adopted. Governments at all levels should immediately organize fire fighting. Transportation, communication, commodity, health, and other organizations should provide support and cooperation.

Clause 17. The Jade Dragon Snow-Capped Mountain protection area, Heng Duan Mountain forests, and Lao Jun Mountain Nine-Nine Dragon Pools forests are priority protection and management areas. Harvesting, hunting, herbal medicine collecting, and other destructive

activities are strictly forbidden. Organizations and individuals engaging in scientific research, education, field observation, and development activities in these forests must be approved by the autonomous people's government. Fees will be collected as per regulations.

Only limited harvesting for regeneration purposes are allowed in designated water source protection forests and natural scenery forests.

Clause 18. Newly planted forests, trees adjacent to roads, river banks and reservoirs, and forests in areas with serious soil erosion problems may be sealed off for protection. Forest access may be completely, partially or rotationally closed. Decrees to seal off forests are issued by county, township, and town governments.

Clause 19. Young and mid-aged forests may be thinned as per regulations. Thinning plans must be approved by relevant authorities before being implemented. Forest administration authorities and township and town governments should enhance technical guidance and site inspection.

Clause 20. Clearing forests for farm lands and other destructive activities are forbidden. When it is necessary for organizations and individuals to engage in mining, stone quarrying, gravel extraction, soil extraction, and other activities in forest areas, damage to forests should be minimized, legal permits obtained, and compensation fees paid.

first and second class national vegetation must be protected and harvesting is not allowed. Third class protected vegetation can be harvested but without compromising protection goals.

Nationally and locally ancient and famous trees are given a special protection status.

Destruction of forest protection facilities in forest areas is strictly forbidden.

Clause 21. Forest products and vegetation including trees, bushes, bamboo, precious wild flowers, seeds, seedlings, and reproductive materials entering or leaving the county must be inspected for disease. No transaction is allowed with disease inspection.

Clause 22. Hunting, collecting, digging, trading, processing, and exporting nationally and locally protected wildlife and vegetation are strictly forbidden. Necessary hunting and collecting samples for scientific research and education purposes must be approved by the autonomous county people's government within its jurisdiction. A resource protection fee is applied.

Clause 23. Burning trees for fuel is tightly controlled. Energy efficient stoves, and coal, methane, solar energy, and electricity based stoves are promoted.

Farmers in forest areas are each assigned a quota to collect trees as fuel. The quota is regulated and managed by township governments.

Farmers in nonforest areas are encouraged to plant trees for fuel.

It is forbidden to destructively collect tree roots.

Chapter Four: Harvesting and Operational Management

Clause 24. Enterprises producing forest products at all levels must compile forest operation plans for each operation area. Township and town governments must organize planning for collectively owned forests. Organizations, townships, and towns without operational plans are not allowed to harvest or trade timber.

Total allowable cut is centrally managed. Quantities are assigned to each production category including commercial use, farmers' self-use, household, reproduction, byproducts, and fuel. The quantities assigned to each category are not interchangeable. No organizations and individuals have the right to change allowable cut quantities.

The allowable cut does not include trees harvested through thinning of young and mid-aged forests.

Clause 25. Any organizations and individuals engaging in harvesting must obtain a cutting permit. Harvesting is allowed within the permit period.

State-owned tree farms may present harvest area inventory and planning materials to the antonymous county forest administration authority for cutting permits. Harvesting without a permit or beyond the permit amount are not allowed.

For collectives and individuals, rewritten applications are required. The applications are incorporated by township and town governments into their plans within the given allowable cut. Cutting permits are issued after the plans are approved by the forest administration authority.

Timber approved for building houses cannot be sold.

Clause 26. A 5 to 8% reforestation fee is collected from all sales of trees planted and raised by collectives and individuals. A fee is collected per cubic meter by township or town forest stations, based on a standard timber price in the forest area. Such money goes into a specialized reforestation fund. The fee is returned to collectives or individuals if replanting is completed on time and up to standard. The fee is retained if a reforestation obligation is not fulfilled.

A forest tax is charged to timber sales based on cutting permits.

Clause 27. Necessary harvesting induced by natural disasters is confirmed by forest stations in collaboration with township or town governments, and approved by the autonomous county forest administration authority.

Necessary harvesting because of emergency situations is approved by the local leader. Such cutting must be reported afterwards to the forest administration authority for necessary paperwork, and registered with the autonomous county people's government.

Clause 28. Forest operations are tightly controlled. Producers' and manufacturers' legal rights are protected.

The scope and market location of timber trades are proposed by the autonomous county forest administration authority and commercial and industrial administration authority

and approved by the county people's government. These are based on the principles of easy trade, need, and efficient administration.

Clause 29. Timber trades must be conducted on approved market locations and with trading permits.

Timber for sale is inspected by the forest administration authority.

Timber trading businesses may engage in selling and purchasing timber outside the county, if proper business and operation licenses have been obtained.

Taxes are applied to any timber trade as per regulations.

Clause 30. If any state enterprises, township and town enterprises, or individuals wish to engage in forest products, they must apply for a forest product operation permit from the autonomous county forest administration authority. With such a permit, a business license can be obtained from the county commercial and industrial administration authority. Operations without a license are not allowed.

Clause 31. Demand and supply cooperatives may engage in trading timber for farming tools, fuel, and rural household furniture if they adhere to approved plans.

Under normal circumstances, township and town timber processing plants, with permits and quotas from the autonomous county forest administration authority to produce and sell finished or semifinished products, are not allowed to trade logs.

Collective tree farms that engage in integrated planting, harvesting, and processing should be enthusiastically encouraged.

Clause 32. Businesses with permits to trade timber may sell or purchase timber from those with timber trading permits at approved timber market locations. Manufacturers with licenses to process timber may purchase timber from those with timber trading permits at approved timber market locations.

Clause 33. With the exception of timber trading businesses that report directly to the autonomous county forest administration authority, no other organizations or individuals are

allowed to purchase timber in forest areas. Those with urgent needs to purchase timber in forest areas must be approved by the forest administration authority, and purchase timber according to pre-approved locations, times, quantities, species, and grades.

Clause 34. State-owned enterprises should actively develop forest product processing and manufacturing, and promote integrated planting, harvesting, processing, and marketing. To increase resource use efficiency and income from forest products, state-owned enterprises should also assist townships and villages in developing specialized forest products, utilizing harvesting wastes and forest byproducts.

Multichannel timber trading and forest product processing operation should be developed without compromising the total allowable cut. State-owned enterprises form the core operation, which is supplemented by collectively owned and operated operations.

Clause 35. Transportation permits are necessary to transport timber. No organizations and individuals are allowed to transport timber without permits.

Chapter Five: Forest Funds

Clause 36. Counties and townships with proper economic, administrative, and other conditions should establish forest funds. Such funds are collected and managed at different levels, and receive supervision from financial administration authorities at the same level of government. The funds are managed separately and can only be used for tree planting, forestry infrastructure development, and protection of forests, wildlife, and vegetation. Forest funds may include money for:

1. tree planting;
2. renovation and replacement (road extension fee);
3. grant allocations from senior governments;

4. fees, as per regulations, collected for sample collection, trading of wildlife and plants, and other business activities;
5. green fees collected as per regulations;
6. fiscal allocation from the county and township governments;
7. poverty alleviation fund, and
8. other income.

Clause 37. The county and township financial authorities should include investments in the forestry sector into their annual budgets, and gradually increase the income from forestry sector.

The financial penalty collected by the forest administration authority is transferred into general revenue. Most of the revenue contribution from the financial penalty are reinvested into the forestry sector.

The total amount of the forest fund collected and managed by the autonomous county is used to develop the forestry sector.

Chapter Six: Forest Administration

Clause 38. The ownership and right to use state-owned forests, collectively owned forests, private forests, and management responsibility for forests through contracts are protected by law.

Normally, the surveyed boundaries for state and collectively owned forests cannot be changed. Necessary changes to the boundaries must be approved by the autonomous county people's government as well as the authority who manages the original boundaries.

Disputes over forests and forest lands should be resolved through negotiations and mediation. If a dispute still cannot be solved, it could be decided by a senior government. If parties are not satisfied with the ruling, they may appeal the decision to a people's court. No

parties are allowed to destroy forest lands and harvest trees while a dispute is being processed.

Clause 39. If destruction of forest lands is necessary for construction and development, the organization responsible for the construction and development should apply for land as per regulations. Relevant authorities may approve an application within their jurisdiction after comments are obtained from the county forest administration authority. The land management authority may process a land transfer after it is approved. Either a compensation fee is collected or reforestation comparable in size is required to mitigate the lost forest.

Clause 40. Although forests are centrally planned and managed, this system of governance is separately managed, and processing and marketing functions are coordinated. The centralized management system is supplemented by independent operations which may be achieved through a variety of arrangements: individual contracts; reforestation contracts to a collective of households; management contracts; investment by contributing forest lands; vertical operation of processing and marketing, joint tree farms between collectives and households; joint ventures between the state and collectives or individuals; borrowing lands to plant trees; and joint tree planting between organizations, schools, civil organizations, townships and villages. Joint operations may take many forms, and profits are shared accordingly.

Clause 41. If disputes over forests and forest lands arise pertaining to forests assigned to individual family use and contract forests, the parties with forest management responsibilities may not destroy forests under any circumstances. Forests assigned to individual family use may be reclaimed by collectives if a family does not have the ability to manage and operate the resource.

If individuals with rights to manage forests no longer desires to fulfill their contract obligations, they forests may be reclaimed by collectives and transferred to other individuals through new contracts.

Clause 42. The paper work, including harvest permits, sale permits, transportation permits, timber and forest product trading permits, confiscation receipts and penalty receipts, are centrally controlled and distributed by the autonomous county forest administration authority. Forgery and trading of permits and receipts are strictly forbidden.

Clause 43. Any timber leaving the county boundary, or passing through a timber inspection station established by the county and approved by the provincial people's government, must accept inspection.

Inspection staff on duty should wear law enforcement signs.

Chapter Seven: Forest Science and Education

Clause 44. Forest education and scientific research should be enhanced. Forest technical expertise should be enthusiastically nurtured. The level of forest science and technology should be raised, and conditions for scientific research improved. Forest officials and staff should enhance their training and constantly raise their policy, professional, and managerial abilities.

Clause 45. Departments in charge of forest scientific research, tree planting, and seedlings should summarize and popularize advanced technology. Superior tree species and scientific regeneration methods should be promoted. The purpose is to raise forest quality and enhance the uses of forest resources.

The major mandate of the autonomous county forest scientific research organization is to promote forest science and technology. This organization serves the forestry sector through the introduction, planting and management of superior, fast growing species suitable for local conditions.

Clause 46. The autonomous county forest disease and pest prevention and inspection organization should enhance the forecast, prevention, and inspection of forest diseases and

pests. It should also engage in research and application of forest disease and pest prevention technology.

Clause 47. According to the forestry sector demand, the autonomous county school of agricultural science and technology may establish specialized forest technology training courses. Students from mountainous areas are given priority in an effort to develop a core of forest technicians for mountainous villages.

Rural vocational training schools and rural middle schools may also arrange forest technology classes.

Chapter Eight: Management Responsibility

Clause 48. Forest protection and forest development are important responsibilities for all levels of governments. A responsibility system should be established for leaders at each level. A system of rewards and penalties must be closely followed. The regulation must be carefully implemented. The main responsibilities for all leaders are:

1. promote and observe national forest legislation, regulations, and policy, and constantly raise the forest and ecological knowledge of people in the county;
2. enhance macro management of the forestry sector, and plan and organize tree planting, resource protection, timber production, business operation, and forest science and technology developments;
3. encourage and supervise reporting governments and forest officials to administer according to the law, and balance the interests among the state, collectives, and individuals pertaining to forest production and business operation;
4. identify and support model forestry organizations, summarize their experience, and use models to promote forest activities in the whole county.

Clause 49. The main responsibilities for forest administration authorities are to:

1. promote and implement national forest legislation, regulations, and policy;
2. manage forest activities and process violations according to law;
3. complete annual tree planting tasks to a high standard;
4. closely observe the annual allowable cut and adopt timber conservation measures, collaborate with energy conservation organizations in promoting fuel efficient stoves, and develop new rural energy sources;
5. prevent clearing forests for farm lands and abusive harvesting practices;
6. implement forest fire prevention measures and prevent serious fires;
7. prevent forest disease and pests;
8. protect and manage precious and rare wildlife and vegetation;
9. protect ancient and famous trees;
10. comprehensively develop forest resources according to plans;
11. collect and management forest funds and other specialized funds;
12. collaborate with administrative, land, and other officials in the mediation of disputes over forest ownership;
13. promote forest education, science, and technology;
14. enhance infrastructure development in forest areas and improve the living condition for forest workers;
15. successfully complete other tasks assigned by the autonomous county people's government and senior forest administrative authorities.

Clause 50. The main responsibilities of forest stations are:

1. Forest stations are lower-level civil organizations under the leadership of forest administration authorities. As such, they perform administrative and managerial functions in organizing rural collectives and individuals to develop the forestry sectors;

2. promote and implement the *Forest Act*, forest regulations and forest policy. Collect and report grassroots demands and problems pertaining to forestry sector development;
3. cooperate with local governments in compiling annual and long-term forest plans. Guide and organize rural collectives and individuals in engaging in forest production and business operations;
4. inspect and approve tree planting, collect forest statistics, manage forest inventory files, and stay informed of changes in forest resources within their areas of responsibility;
5. confirm that collectives and individuals within their area operate within the annual allowable cut. Issue timber harvest permits as per instructions from forest administration authorities. Inspect and supervise the harvesting, transportation and trading of timber and bamboo within their area;
6. cooperate with relevant authorities in mediation of disputes over forest ownership and in adjudicating the acceptability of activities which will destroy the forest. Successfully implement forest fire prevention and forest disease and pests forecast and prevention measures;
7. popularize forest science and technology. Summarize and promote forest production models. Engage in forest technical training, technical consultation, and technical services;
8. collect forest funds and other fees on behalf of relevant authorities and according to government regulations. Cooperate with senior authorities in proper uses of forest funds within the responsible area.

Clause 51. The main responsibilities for forest administration staff are:

1. promote and observe forest legislation, regulation and policy;

2. cooperate with administrative and natural village governments in organizing tree planting, forest fire prevention, and forest disease and pest prevention activities;
3. patrol forests and prevent forest destructive activities;
4. report destructive forest activities to relevant authorities, and request that the authorities deal with such activities according to law.

Clause 52. Forest administrative staff and forest protection staff perform their duties according to law. Their lawful activities are legally protected.

Chapter Nine: Rewards and Penalties

Clause 53. Organizations and individuals performing any of the following commendable activities may be rewarded verbally and financially by governments and forest administration authorities at all levels:

1. assiduously observing forestry legislation, regulations, and policy, and struggling against activities in violation of forest legislation, regulations, and policy with remarkable results;
2. achieving exceptional leadership performance in completing forest protection, forest development, and other tasks;
3. avoiding significant property losses to the state and people through prevention of abusive harvesting and other destructive incidents with remarkable results;
4. promoting scientific forestry research, forest education, forest technology, forest knowledge, superior species, and reforestation with remarkable results;
5. consistently adopt and update rational harvesting methods with remarkable results;
6. overfulfilling annual tree planting tasks with a survival rate at more than 90%;
7. actively engage in resource development, integrated use, energy conservation and vertical business operation with remarkable results;

8. achieving three consecutive fire free years on township-, town-, and state-owned forests and nature reserves, and achieving five consecutive fire free years on administrative and natural village-owned forests, including individuals with exceptional contributions in:

9. fire discovery and fire fighting;

10. wildlife and vegetation protection;

11. forest disease and pests prevention;

12. reporting and preventing destructive forest activities and other violations of law;

13. other contributions to forest development with commendable results.

Clause 54. Organizations and individuals may be penalized for committing any of the following regulatory violations:

1. The county people's government issues warnings to townships and towns which fail to fulfill annual tree planting targets or have disproportionally large numbers of forest fires. Reprimand is applied to individuals with administrative and managerial responsibilities for serious negligence of duty. Legal charges are applied to individuals with criminal offences.

   The annual allowable cut for a following calendar year is suspended if a state, township, or town-owned tree farm, or forest company harvest beyond their allowable cut, or falsify records to hide unauthorized harvesting. Administrative and financial penalties are applied to individuals with administrative and managerial responsibilities for serious negligence of duty. Legal charges are applied to individuals with criminal offences.

   Appropriate reprimand is applied to forest staff and relevant administration staff who either do not stop, or do not make adequate efforts to stop, destructive harvesting within their areas of responsibility which result in serious forestry damages.

2. According to clause 20, the regulation regarding economic penalties pertaining to illegal harvesting, a penalty of ¥500 to ¥1000 is applied to each tree. Those who illegally cut trees pertaining to clause two and three must compensate for the losses, pay a penalty, and face potential criminal charges. Those who damage forest protection facilities in forest areas must also compensate for the losses and pay a penalty.
3. Appropriate reprimand may be applied to staff who issue permits which exceed cutting plan that result in harvesting beyond the allowable cut, or make personal gains by selling timber receipts. Criminal charges may be applied to those directly responsible for significant financial losses.
4. Heavy penalties are applied to administrative forest staff who commit violations of the regulation. Appropriate disciplinary penalties may be applied to staff who arbitrarily let timber bearing vehicles pass without timber transportation permits. Those who accept bribes in exchange for the privilege of proceeding may face criminal charges.
5. The penalty section of the *Forest Act* applies to harvesting without permits.
6. Organizations and individuals operating without timber and forest product permits and business licenses are processed by the industrial and commercial administration authority according to relevant regulations. Privately raised timber sold without sale permits are confiscated by forest administration authorities.
7. Timber purchased from operators who do not have harvesting or trading permits are confiscated, and a penalty equivalent to 10 to 15 percent of the total timber value is applied to the responsible party. Criminal charges may also be applied to those who irresponsibly purchase timber which results in illegal cutting and destructive harvesting practices.

8. Harvesting under the pretense of an emergency or military uses when allocating the harvested timber to other uses is equivalent to destructive harvesting practices.

9. Those who purchase usable timber as scrap must pay a penalty three to four times the timber value.

10. The *Forest Harvesting and Reforestation Management Regulation* applies to harvesting that does not conform to procedures stipulated in a cutting permit. These include:

11. A penalty no more than ¥1000 may be applied to forgery and changing and trading of forest permits and forest product business licenses. Illegal gains are confiscated and a penalty four to six times the illegal gain is charged. Criminal charges may be applied to significant offences.

12. Forest administrative authorities may order compensation for damaged tree as results of clearing for farm land, stone and gravel quarries, soil removal, and other industrial and nonindustrial activities. The authorities may also order a responsible party to replant two to four times the number of damaged trees.

13. Those who dig out tree roots for fuel, or for making tree root sculptures, must replant one tree for each lost root. Repeat offenders may be ordered to replant four to six trees for each lost root.

A tree planting fee is collected by forest administration authorities from those who do not follow their tree planting orders. A penalty no more than three times the tree planting fee is also charged.

14. Forest administration authorities may order those who clear forests for farm lands to reforest the land, compensate the loss, and pay a penalty.

15. Those who use outdoor fires in forest areas during a forest fire prevention season are charged ¥10 to ¥30 for each violation. Those who cause forest fires must pay for the fire fighting expenses, and take responsibilities as per forest fire prevention

regulations. Criminal charges may be applied to significant offences. For forest fires caused by those who are under age or suffer from mental illness, partial compensations may be charged to guardians responsible for the supervision of the responsible parties. Criminal charges are applied to those who intentionally start fires.

16. The *Vegetation Inspection Regulation* and the *Forest Disease and Pest Prevention Regulation* apply to any violation of seedling inspection and disease and pest prevention regulations.

17. The *Wildlife Protection Act* applies to any illegal harvesting and collecting of nationally protected wildlife and vegetation.

18. Brick manufacturers, plaster manufacturers, and other industrial enterprises which continue to use wood as fuel despite an available energy alternative are charged a penalty four to six times the standard tree planting fee. They may also be ordered to stop production until a new energy source is adopted.

19. Heavy penalties are applied to those who interfere with law-execution staff in performing their duties; beat, harm, and verbally abuse law-execution staff, or take revenge on informants.

20. Other activities that may be penalized.

Clause 55. Administrative warnings and penalties are applied by relevant administrative authorities according to legal procedures. Money collected through penalties is administered by financial authorities.

Clause 56. Those who disagree with penalties issued by a forest administration authority, or other organizations with delegated responsibilities may, within 15 days after receipt of a penalty, appeal to a senior forest administration authority. If the offender disagrees with the decision from the senior forest administration authority, s/he may, within 15 days after receipt of a decision, appeal the decision to a court. Forest administration authorities may ask

a court to implement a penalty decision by force if an offender neither appeals within the deadline nor complies with a penalty.

Chapter Ten: Supplementary Principles

Clause 57. The regulation is interpreted by the Lijiang Naxi Autonomous County People's Representative Assembly Standing Committee.

Appendix C

The Yunnan Province Lijiang Naxi Autonomous County Jade Dragon Snow-Capped Mountain Management Regulation

Lijiang Naxi Autonomous County People's Representative Assembly

Standing Committee

March 19, 1993

Chapter One: General Principles

Clause 1. The Lijiang Naxi Autonomous County Jade Dragon Snow-Capped Mountain is the main attraction in the Jade Dragon Snow-Capped Mountain Natural Scenery and Attraction area. It is a provincial class, State Department approved natural protection site. According to the *People's Republic of China Autonomous Administration in Ethnic Minority Area Act*, *Forest Act*, *Wildlife Protection Act,* and *Yunnan Province Autonomous Administration in Lijiang Naxi Autonomous County Act*, and based on the practical situation of the county, the regulation is compiled to enhance the management of the Jade Dragon Snow-Capped Mountain. It protects the ecological environment, and promotes rational development and use of its natural resources.

Clause 2. The Jade Dragon Snow-Capped Mountain Management Area (the management area) includes 26,000 acres, ranging from 100°04'10" to 100°16'30" eastern latitude and from 27°3'20" to 27°40'00" northern longitude. The maximum length is 26 kilometers from north to south, and 19 kilometers east to west.

Clause 3. The Jade Dragon Snow-Capped Mountain management follows the principle of balancing protection with rational development and use. Contemporary glaciers, ancient glaciers, typical vertical mountainside ecological systems in pristine condition, alpine vegetation, areas with concentrated plant species, and endangered species are strictly

protected. Development and use of natural resources are scientifically and rationally planned to realize the principle of balancing ecological benefits with economic and social benefits.

Clause 4. Lijiang Naxi Autonomous County Jade Dragon Snow-Capped Mountain Management Committee (the management committee) is established. The management committee exercises centralized management functions.

Clause 5. The activities of any organizations and individuals within the management area must conform to the regulation.

Chapter Two: The Management Committee and its Responsibility

Clause 6. The management committee exercises its responsibilities within the management area. The committee accepts leadership from the Autonomous County People's Government and guidance from relevant authorities at, and above, the county level.

Organizations reporting to the management committee may be established at the discretion of the Autonomous County People's Government.

Clause 7. The major responsibilities of the management committee include:

1. implementing national law, legislation, and policy pertaining to the management of natural scenery and attraction sites as well as natural protection areas;
2. conducting comprehensive planning regarding the protection, development and use of natural resources in the management area;
3. engaging in environmental and ecological protection public education;
4. compiling and administering management plans for the management area;
5. protecting and enhancing precious and rare wildlife and plant resources;
6. enforcing legislation and regulations pertaining to illegal destruction of the ecological environment, natural resources and natural scenery and attraction sites;
7. organizing scientific research;

8. planning and systematically developing tourism services, tourism resources, and the tourism industry.

Clause 8. The management committee should coordinate with township governments in the management and neighboring areas to form joint protection organizations, reach protection agreements, and collectively implement management plans.

Clause 9. Staff working in the management area should closely observe the regulation and relevant national legislation.

Chapter Three: Protection and Management

Clause 10. Nationally protected precious and rare wildlife and plants within the management area are strictly protected.

Relevant authorities should actively cooperate in managing forests, natural scenery and attraction sites, and natural environment adjacent to the management area.

Clause 11. Taking trees, impairing and polluting the environment, hunting, cultivating land, using explosives to quarry rocks, excavating sand and gravel, and engaging in other activities that damage wildlife and plant resources within the management area are strictly forbidden.

Clause 12. Those who intend to engage in scientific research, education, video and film taking, mountaineering, and other activities must apply to the management committee. Entrance is only allowed after a permit is obtained.

No organizations or individuals are allowed to purchase wildlife, medicinal plants, flowers, bamboo, and other forest products within the management area. Those wishing to capture wildlife and collect samples for scientific research, education, and exhibition purposes must apply for permission as per procedures. Activities must adhere to stipulated times, locations, areas, species, and quantities. Resource protection and management fees are applied.

Guns, ammunition, explosives, combustibles, and hunting tools are not allowed into the management area.

Clause 13. An organization must seek the management committee's consent before signing agreements related to the management area with overseas organizations.

Clause 14. The management area size and border cannot be changed or moved. Border signs and posts cannot be destroyed.

Clause 15. Litter and disposal of materials harmful to public health within the management area is strictly forbidden.

Destroying and contaminating water sources, systems, and quality are strictly forbidden.

Clause 16. The management committee may compile comprehensive plans for the existing village residents within the management area. Proper consideration should be given to their daily life and work. Villagers must strictly follow the management committee's decisions.

Immigration and relocation into the management area are forbidden. Once discovered, such individuals will be expedited to their original residential locations.

Clause 17. Community forests and private forests within the management area are managed through centralized planning although communities and individuals maintain their ownership of land.

Clause 18. The management committee may establish management files.

Chapter Four: Development and Use Management

Clause 19. Activities in the management area must follow the comprehensive plan and the principle of rational resource use within the management area. Stakeholders' enthusiasm and capital investment through various channels are encouraged. Development should focus on

the service industry, especially on tourism. Proposed projects must seek approval from the autonomous county government.

Clause 20. Development of tourism resources should follow the principles of balancing protection with development, centralized planning, centralized design, and centralized management.

Favorable policies are adopted to attract outside capital, technology, and expertise. Sole source investment, joint ventures, and multisource investment are encouraged to develop ecological parks, bird parks, alpine sport facilities, a nationality village, holiday resorts, and other tourism facilities.

The autonomous county government delegates powers identical to those of the management committee to development and management organizations authorized by relevant provincial authorities. They may engage in tourism development which are compatible with approved plans and share equivalent protection responsibility for their development activities.

Clause 21. Observations of plants, wildlife, soil, climate, and other elements within the management area may be conducted. Observation and research priority should be given to precious, rare, and endangered wildlife and plants to study their life cycles. Feeding, domestication, and breeding facilities should be established. A plant sample center, a gene bank, a seed bank and a nationally protected species research material center may be established to support social and economic development.

Clause 22. Wildlife and plant resources are rationally used. Feeding, domestication, and breeding of precious, rare, as well as ordinary wildlife and plant species may be conducted based on scientific research. The goal is to maximize social and economic benefits.

Clause 23. Ancient glaciers, alpine vegetation, and endangered species must be strictly protected. Scientific research, education, and observational activities are allowed through a vigorous approval procedure.

Mineral deposits in the Jade Dragon Snow-Capped Mountain peripheral areas may be extracted following a vigorous approval procedure with the autonomous county government.

Clause 24. Any organizations and individuals with permits to develop natural and tourism resources, or to engage in other activities, contribute resource fees to the management committee as per regulations.

Chapter Five: Rewards and Penalties

Clause 25. Any organizations and individuals who make any of the following contributions to the management area may be rewarded by the management committee. Organizations and individuals who make significant contributions may be recommended by the management committee for honorary titles and large rewards by the autonomous county government.

1. remarkable achievements in saving precious, rare, or endangered species;
2. significant contributions to scientific research;
3. remarkable performance in curtailing activities which destroy or impair the environment, wildlife, natural scenery, attraction sites, and protected facilities;
4. remarkable economic performance in developing and using natural resources;
5. significant contributions to fighting illegal and criminal destruction of natural resources, or reporting to authorities that lead to the solution of significant files;
6. significant achievements in public education;
7. remarkable contributions to forest fire fighting and prevention;
8. significant contributions to tourism development;
9. other worthy contributions to protection and management.

Clause 26. Any organizations and individuals engaging in any following activities in violation of the regulation may be penalized according to the severity of impacts.

Compensation and financial penalties may be applied according to the species' value and loss of resources. Legal charges are applied to criminal offences.

1. illegally taking trees, capturing nationally protected wildlife, hunting, using explosives to quarry rocks, sand, and gravel, and collecting plants within the management area;
2. purchasing seeds, flowers, wildlife, plants, medicinal plants, and other forest products without permits;
3. bringing guns, ammunition, explosives, combustibles, and hunting tools into the management area without permits;
4. disposing garbage resulting in environmental contamination;
5. constructing buildings and facilities without permits;
6. destroying or moving the management area border signs, posts, and other facilities;
7. disturbing public order or interferring with safety measures and refusing to follow advice; and
8. other destructive activities that may be penalized.

Any illegal economic gains from engaging in activities listed in (1) and (2) are confiscated.

Clause 27. Individuals interferring with administration staff in performing their duty, beating or physically harming administration staff, or taking revenge through violence on persons who reported their wrong doings to authorities are penalized according to law.

Clause 28. The management committee staff should perform their responsibilities to the best of their abilities. Any negligence of duty that result in damages and losses may be reprimanded by the committee or senior administrative authorities. Legal charges may be applied to criminal offences.

Clause 29. The management committee or other relevant authorities may apply reprimand to any violations of the regulation.

If an offender disagree with an reprimand, s/he may, within 15 days after receipt of a penalty, appeal the decision to a senior authority. If the offender disagree with the appeal decision, s/he may, within 15 days after receipt of a decision, appeal to a people's court. An offender may also appeal an reprimand directly to a people's court within 15 days after receipt of a decision. The issuing authority may ask a court to implement a penalty decision by force if an offender neither appeals within the deadline nor complies with a penalty.

Chapter Six: Supplementary Principles

Clause 30. New regulations come into effect on the date when they are approved by the provincial People's Representative Assembly Standing Committee. Such regulations are registered with the national People's Representative Assembly Standing Committee.
Clause 31. The regulations are interpreted by the Lijiang Naxi Autonomous County People's Representative Assembly Standing Committee.

Appendix D

The Yunnan Province Lijiang Historically and Culturally Famous Town Protection and Management Regulation

Lijiang Naxi Autonomous County People's Representative Assembly

Standing Committee

July 20, 1994

Chapter One: General Principles

Clause 1. Applying the constitution and relevant legislation and regulations to the practical situation of Lijiang, the regulation is compiled to enhance the protection and management of the national class Lijiang Historically and Culturally Famous Town, to celebrate ethnic history and culture, and to promote the socialist development of a materialistic and spiritual civilization.

Clause 2. The scope of Lijiang historically and culturally famous town protection and management includes the ancient town of Dayan. This includes ancient architecture, ancient cultural sites and gardens with historical, artistic, and scientific value within the jurisdiction of Lijiang Naxi Autonomous County.

Clause 3. The main principle for Lijiang historically and culturally famous town protection and management is conservation and protection. A comprehensive urban construction plan should be compiled, and necessary maintenance and renovation should be carried out while preserving the original town layout, style, and characteristics.

Clause 4. Lijiang historically and culturally famous town protection and management follows the principle of centralized leadership, supplemented by responsibilities at all governmental levels, and combines professional management with mass management.

Lijiang Naxi Autonomous County People's Government establishes the Lijiang Historically and Culturally Famous Town Protection and Management Committee. The committee is in charge of, and coordinates, management activities among relevant organizations. The Protection and Management Committee establishes an executive office which is responsible for day-to-day protection and management activities.

Township and town governments may establish corresponding protection and management organizations if they are necessary. Such organizations are responsible for protection and management activities within their jurisdictions. The detailed responsibilities for these organizations are determined by the Lijiang Naxi Autonomous County People's Government.

Clause 5.County, township, and town governments should increase financial input into the historically and culturally famous town development, protection, and management. Meanwhile, an historically and culturally famous town protection foundation should be established to raise protection capital for various sources.

Clause 6. Agencies, enterprises, civil organizations, other units, and individuals all share the obligation to protect the historically and culturally famous town, and must follow the regulations.

Clause 7. Organizations and individuals with outstanding contributions to protection and management in implementing the regulation may be awarded by the protection and management authority. Those who make exceptional contributions may be awarded by the autonomous county government as well.

Chapter Two: Protection and Management of the Ancient Town of Dayan

Clause 8. This center is vigorously protected because of its significant historical and cultural value. The original layout, style, characteristics, and ambiance must be faithfully preserved.

Any maintenance, repair, renovations, and rebuilding of buildings, houses, roads, and waterways within the town must be conducted according to the original designs. Building density must be strictly controlled. New buildings which clash with the original designs are forbidden.

Clause 9. The ancient town of Dayan is divided into three protective zones. The first protection zone includes Si Fang Square, Mu Residence, Cuiwen Lane, Huangshan Section, Gongyuan Lane, Golden Star Lane, Guangbi Lane, Mishi Lane, Jishan Lane, Xingren Lower Section, Wenzhi Lane, Stone Tablet Site, People's Square, White Horse Lake, Black Dragon Lake, Budda Temple, Puxian Temple, Lion Hill, and supplementary buildings. The second protection zone includes major streets, waterways, and supplementary buildings within the town. The third protection zone is inclusive of areas and buildings outside the first and second protection zones.

Preservation within the first protective zone is of the highest order. Any repair, new construction, and functional adjustments of buildings and houses within this zone must faithfully maintain the original design. The second protective zone practices style and ambiance preservation. New facilities which are not directly related to the functioning of the ancient town are not allowed in this zone. Renovations and necessary new buildings should retain the style and ambiance of neighboring areas. Style and ambiance harmonization is also the principle of the third protective zone. New developments and buildings are allowed as long as they are harmonious with the overall ancient town style and ambiance.

Clause 10. No organizations and individuals are allowed to unilaterally relocate, dismantle and renovate buildings, road, waterways, and other facilities in the ancient town of Dayan. Plans for necessary maintenance, repairs, renovations, and rebuilding must be compiled according to appropriate protection classes by relevant organizations. Work can only proceed after a plan is approved by the Autonomous County People's Government.

Clause 11. Organizations and individuals located within the ancient town of Dayan who need to engage in repairs, renovations, rebuilding, and new construction activities must apply for permits at the Urban Construction Administration Authority. After a permit is acquired, the activity must be conducted strictly according to regulated procedures and standards under the guidance and supervision of the Protection and Management Committee and other relevant authorities.

Clause 12. Construction buffer zones may be established around the ancient town of Dayan. The location and size of a buffer zone is determined by the Autonomous County People's Government. Construction within a construction buffer zone would have to follow a master plan. For example, the height of a new building could not exceed those of ancient buildings inside the ancient town of Dayan.

Clause 13. Building density within the ancient town of Dayan must be closely controlled. The principle of reasonable population relocation through comprehensive planning must be followed. New residential communities will be systematically established outside the ancient town of Dayan according to county plans.

Clause 14. The balance of industrial structure within the ancient town of Dayan will be gradually adjusted. Priority will be given to industries with local ethnic characteristics which do not generate pollution nor cause public harm. The balance of the commodity and retail market within the ancient town will be rationally arranged. Areas devoted to ethnic culture, handicraft products, ethnic foods and tourist attractions will be developed based on the available resource, space, and infrastructure.

No enterprises which cause pollution or public harm are allowed within the ancient town of Dayan. The existing ones must correct any emissions or relocate within strict time lines.

Clause 15. Road protection and traffic security within the ancient town of Dayan will be enhanced. Small-size motor vehicles can only operate within stipulated hours with the

exception of approved vehicles for daily life, hygiene, fire fighting, and administrative purposes. No other motor vehicles are allowed.

Clause 16. The protection and management of waterways within the ancient town of Dayan will be enhanced. Measures to protect water sources, strengthen and maintain river banks, deepen rivers and lakes through dredging, and to maintain river water purity and quality will be adopted. Disposal of garbage and contaminated materials into rivers is forbidden.

Clause 17. Protection, management, and civil infrastructure within the ancient town of Dayan will be enhanced to maintain the ancient, simple, tidy, clean, and beautiful town landscape. Trees, flowers, and grass will be systematically planted along streets, river banks, courtyards, and other empty space to beautify the town environment.

Organizations and individuals located within the ancient town of Dayan must exercise crime, fire, and disaster prevention.

Clause 18. The following activities are forbidden when protecting and developing the ancient town of Dayan:

1. building without approval and causing damage to the ancient architecture;
2. interferring with traffic and causing damage to the town landscape;
3. causing damage to waterways and facilities which results in water contamination;
4. causing damage to public security and well-being;
5. interferring with administrative staff in performing their duty;
6. other activities in violation of the protection and management regulations.

Chapter Three: Protection and Management of Historical Artifacts

Clause 19. According to historical artifact legislation and regulations, all the immobile historical artifacts within the boundary of the autonomous county should be classified as of

national, provincial, district, and autonomous county importance according to the historical, artistic, and scientific value following an application and approval procedure.

Clause 20. Protective emphasis will given to ancient architecture. Within the ancient town of Dayan and in Baisha, these include: ancient temples, ancient stone tablets, ancient tombs, ancient murals, rock paintings, the Stone Town of Baoshan, the Shigu (stone drum), the suspension bridge in Shigu Town, the Golden Dragon suspension bridge, Dongba script, Dongba paintings, Dongba murals, the Golden Sand ferry terminal site which the Red Army used during the Long March, the suspension bridge site at Tacheng, the East-Yuan White Pagoda site, the prehistoric Lijiang man site, and artifacts, historical attractions, and sites yet to be discovered.

Clause 21. The Autonomous County People's Government will establish surveyed boundaries, background information posters, and archives for the protected sites. Protective organizations or staff will be established to take charge of these protection and management initiatives.

Necessary construction buffer zones around protected sites may be established with the approval from the Autonomous County People's Government. Repairs, renovations, rebuilding, and new construction within a construction buffer zone must not cause damage to the style and ambiance of a protected site.

Clause 22. Protected sites may be open to the public through the centralized management by the Autonomous County Cultural Administration Authority (ACCAA).

No organizations, units, and individuals are allowed to occupy protected sites. If a unit needs to use a protected site, it must be approved and a contract of protection and maintenance expense responsibility must be signed with the Autonomous County Cultural Administration Authority. The unit must accept guidance and supervision of ACCAA.

Clause 23. Archaeological exploration within the boundary of the autonomous county is arranged by the national or provincial archaeological exploration authorities according to

legislation. No organizations and individuals are allowed to unilaterally engage in exploration.

Historical artifacts discovered during construction, industrial and agricultural production, and construction of private residences must be reported to the cultural administration authority while protecting the discovery site. Discovered historical artifacts will be collected and stored by the cultural administration authority. No organizations and individuals are allowed to distribute, relocate, and retain in whole or in part such artifacts.

Clause 24. Artifacts in private collections may be purchased by units appointed by the cultural administration authority. No other organizationsor individuals are allowed to engage in purchasing historical artifacts.

Historical artifacts which are allowed for trading under national regulations may be traded on the market after they are inspected and approved by historical artifact administration authorities.

Clause 25. The discovery, collection, compilation, and research of ethnic historical cultural heritage will be enhanced. To maintain and promote ethnic culture, an effort will be made to save and protect Dongba culture, Baisha Dao music, Lijiang ancient music, and other components of the cultural heritage.

Clause 26. Use of ancient architecture, historical artifacts, and attractions for video taping, television, movies, and other purposes must be approved by the Autonomous County Historically and Culturally Famous Town Protection and Management Committee. Image taking may be carried out within the approved area, and sponsors must guarantee the security of objects being photographed. A reasonable protection and management fee will be collected.

Clause 27. The following activities are forbidden when practicing historical artifact protection and management:

1. exploring for, distributing and concealing historical artifacts illegally and without permission;
2. occupying or damaging protected sites;
3. destroying or damaging historical architecture and protective facilities;
4. duplicating, imitating, or forging historical artifacts illegally;
5. purchasing or trading historical artifacts without permits;
6. interferring with historical artifact administration staff in performing their duty;
7. other activities in violation of historical artifact protection and management regulations.

Chapter Four: Natural Scenery and Attraction Site Protection and Management

Clause 28. The scope of natural scenery and attraction site protection and management includes the Black Dragon Lake, Lion Hill, White Horse Lake, Yulong Garden, Yangtze First Bend, Liming, the Stone Town of Baoshan, Yulong Snow Mountain, Tiger Leaping Gorge, Laojun Mountain, Ninety-Nine Dragon Lake, ancient and famous trees, and ancient architecture.

The management of Yulong Snow Mountain follows the *Yunnan Lijiang Naxi Autonomous County Yulong Snow Mountain Management Regulation.*

Clause 29. Each natural scenery and attraction area may establish management organizations according to needs. The management organizations operate under the leadership of the Autonomous County Historically and Culturally Famous Town Protection and Management Committee. The management organizations may be responsible for the protection and management of natural scenery and attraction sites according to legislation and regulations, and compile and implement development plans.

Relevant authorities from the Autonomous County People's Government should enhance their roles in providing guidance and supervision.

Clause 30. Surveyed boundaries, background information posters, and archives should be established for each natural scenery and attraction site. Protection and management should be enhanced.

Clause 31. Improvement of tourism services, other services, and transportation may be incorporated into the development of natural scenery and attraction sites, based on local needs and conditions and under the precondition of protection of historical sites, ancient architecture, and ancient trees.

Clause 32. New construction within natural scenery and attraction sites must apply for permission with the administrative authority according to regulations. Once permission is received, construction must strictly follow the stipulated standards, and contractors must accept guidance and supervision from the administrative authority.

No development of enterprises causing pollution and other forms of public harm is allowed within a protection site.

Clause 33. Wildlife and vegetation within natural scenery and attraction sites are protected as stipulated in relevant legislation.

Research and sample collections for teaching and scientific purposes must be approved by the national and provincial administrative authorities before applying for permits at the Autonomous County Historically and Culturally Famous Town Protection and Management Committee. Reasonable resource protection fees are charged.

Clause 34. Within natural scenery and attraction sites, tree planting, closure of access, fire prevention, disease and pest control, and other activities to beautify and improve green cover within natural scenery and attraction sites may be conducted according to local characteristics and conditions.

Clause 35. Domestic and international organizations, enterprises, and individuals are encouraged to participate in natural scenery and attraction sites development and tourism services and operation. Their legal rights are protected by national legislation, and they enjoy favorable treatment locally.

Clause 36. The following activities are forbidden within natural scenery and attraction sites:

1. occupancy and possession of land, trees and water resources;
2. destruction or damage to public buildings and protective facilities;
3. destruction or damage to natural resources and ecology;
4. illegal collection of wildlife and vegetation samples;
5. possession of contaminated materials, explosives, and combustibles;
6. interference with normal tourist activities;
7. interference with administrative staff in performing their duty;
8. other activities in violation of protection and management regulations.

Chapter Five: Penalties

Clause 37. The following penalties may be applied to those engaged in forbidden activities stipulated in clauses 18, 27, and 36 by the Autonomous County Historically and Culturally Famous Town Protection and Management Committee, in collaboration with other relevant authorities:

1. warning;
2. confiscation of illegal gains;
3. compensation for damages;
4. financial penalties; and
5. cancellation of licenses and permits.

The above penalties may be applied individually or in combination.

Any violation of the *People's Republic of China Public Security Management Regulation* are penalized by the public security authority.

Law-execution authorities may apply legal charges to criminal offences.

Clause 38. Administrative staff must be fair and law abiding. It is forbidden to take responsibilities lightly, accept bribes, and abuse power to make private gains. Any violation of the regulation will be heavily penalized..

Clause 39. If an offender disagree with a penalty decision, s/he may, within 15 days upon receipt of the decision, appeal either to a superior organization or directly to a people's court. If an offender disagree with an appeal decision, s/he may, within 15 days upon receipt of the decision, appeal to a people's court.

If an offender neither appeal a penalty decision within the deadline nor implement the decision, the organization which issued the decision may ask the people's court to implement by the decision by force.

Chapter Six: Supplementary Principles

Clause 40. Townships, towns, and villages with a long cultural history may apply to the Autonomous County People's Government for the status of historically and cultural famous townships, towns, and villages. Once approved, their protection and management may follow conventions of the regulation.

Clause 41. According to needs, relevant administration authorities under the Lijiang Naxi Autonomous County People's Government may compile concrete protection and management rules based on the regulation. The rules may be implemented after they are approved by the Autonomous People's Government.

Clause 42. The Lijiang Naxi Autonomous County People's Representative Assembly Standing Committee is responsible for interpretation of the regulation.

Clause 43. The regulation comes into effect the date it is approved by the Yunnan Province People's Representative Assembly Standing Committee. The regulation is registered with the National People's Representative Assembly Standing Committee.

Clause 44. The regulation is implemented on the date it is announced.

Appendix E

Yunnan Province

Construction Project Site Selection Proposal

Application Form

Project Proponent:_____

Project Title:_____

Application Date:_____

File Number: XX-XXX

Compiled by the Yunnan Province Urban and Rural Construction Committee

Construction Project Site Selection Proposal Processing Procedure

1. The relevant urban planning administration authority, within the limit of its jurisdiction, should participate in Construction Project Site Selection Proposal processing and site selection during the feasibility study.

2. The project proponent, after obtaining a project approval, applies to the local urban planning administration authority for site selection and fills out the application form.

3. The local urban planning administration authority advises on site selection terms of reference according to the local plan, feasibility report, and the 1991.583 document issued by the Construction Division under the National Planning Commission.

When applying for approval, the Construction Project Site Selection Proposal issued by the local urban planning administration authority must be attached to the feasibility report.

File Number Decoding

File number coding is standardized to facilitate scientific management,

XX (year) - XXX (serial number)

Basic Project Information

Project Proponent
Project Title
Person in Charge and Phone Number
Contact and Phone Number
Data Source
Senior Administrative Authority
Nature of the Project
Construction Area Size (square meters)
Project Investment
Fuel Consumption (tons/year)
Water Consumption (tons/year)
Number of Employees (persons)
Electricity Load (kw)
Annual Electricity Consumption (kwh)
Gas Consumption (cubic meters/day)
Goal Consumption (tons/year)
Transportation Volume (tons/year)

Means of Transportation
Other

Pollution Profile

Gas Waste (cubic meters/day)
Liquid Wastes (tons/day)
Solid Wastes (tons/year)
Noise (db)

Danger of Fire and Explosion

Basic Project Proponent Information

Company Location
Number of Employees
Total Use of Land (hectares)
Productive Use of Land (ha)
Nonproductive Use of Land (ha)

Is the project site located in a natural scenery and attraction area, historical site, or other protected areas? If the answer is positive, provide the site name.

A brief description the construction technology and process

Comments from the responsible authority	
Official Stamp	Date

Comments from the urban planning administration authority on site selection	
Official Stamp	Date

1. Comments on project site selection

Official Stamp Date

2. Comments on project site selection

Official Stamp Date

3. Comments on project site selection

Official Stamp Date

Description of the Attached Documents

Record of Documents Received
Delivered by Received by

Appendix F

Interviewees

Name	Agency	Title	Date of Interview
Cao, Jianzhong	The Bureau of Urban Construction	Senior Planner	December 6, 1995
Chen, Yongsheng	The Bureau of Water & Hydroelectric Power	Vice-Director	December 11, 1995
Cun, Shouquan	The Bureau of Forests	Manager, Reforestation	December 13, 1995
Di, Wenjin	The Bureau of Agriculture	Agricultural Specialist	December 14, 1995
Han, Zhenwu	Jade Dragon Snow-Capped Mountain Protection Committee	Manager	December 13, 1995
He, Rongcheng	The Bureau of Environmental Protection	Director	December 6, 1995
He, Xueya	The Planning Commission	Special Task Force	December 15, 1995

He, Yaocai	The Bureau of Agriculture	Vice-Director	December 14, 1995
He, Yingchun	The Environmental Hygiene Station	Vice-Director	December 13, 1995
He, Yunzhang	The Bureau of Urban Construction and Environmental Protection	Party Secretary	December 6, 1995
He, Zi	The Planning Commission	Investment & Financing Analyst	December 15, 1995
Hong, Jianxing	The Planning Commission	Vice-Director	December 15, 1995
Li, Congren	The Bureau of Water & Hydroelectric Power	Manager, water management	December 7 & 8, 1995
Name	Agency	Position	Date of Interview
Li, Shibing	The Bureau of Forests	Executive Assistant, Director's Office	December 13, 1995
Li, Wenjian	The Bureau of Agriculture	Agricultural Specialist	December 14, 1995

Mao, Yongjun	The Planning Commission	Senior Planner	December 15, 1995
Qi, Liwu	The Planning Commission	Special Task Force	December 15, 1995
Qi, Xuzhong	The Bureau of Forests	Former Director	December 13, 1995
Su, Yongquan	The Bureau of Agriculture	Agricultural Specialist	December 14, 1995
Xu, Guangping	The Drinking Water Company	Manager, Installation	December 11, 1995
Yan, Liying	The Bureau of Water & Hydroelectric Power	Engineer	December 11, 1995
Yang, Maoren	The Environmental Monitoring Station	Director	December 8, 1995
Yang, Tielong	The Disease Prevention Station	Director	December 7, 1995
Yang, Yangjun	The Planning Commission	Industrial Inspection Officer	December 15, 1995
Zhao, Lin	The Bureau of Agriculture	Agricultural Specialist	December 14, 1995
Zhao, Zikuan	The Planning Commission	Special Task Force	December 15, 1995

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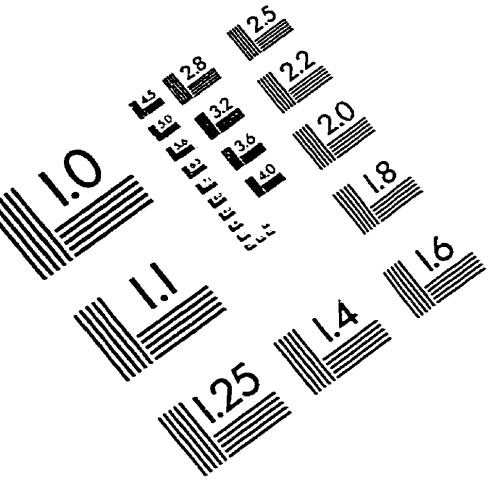
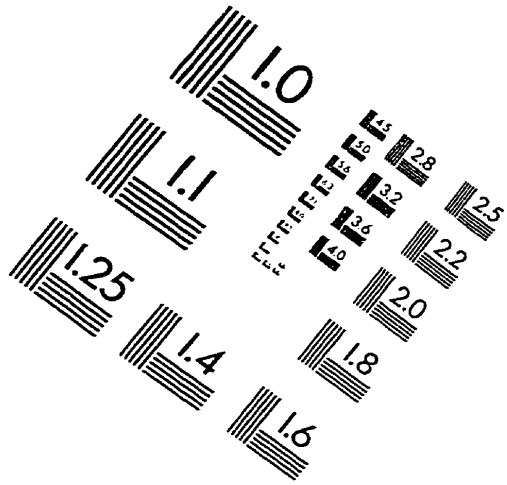
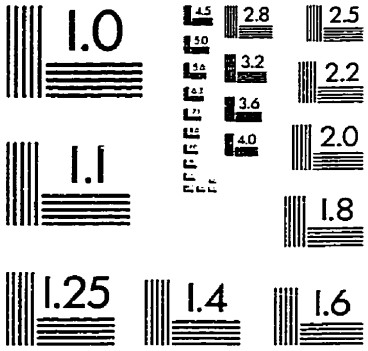
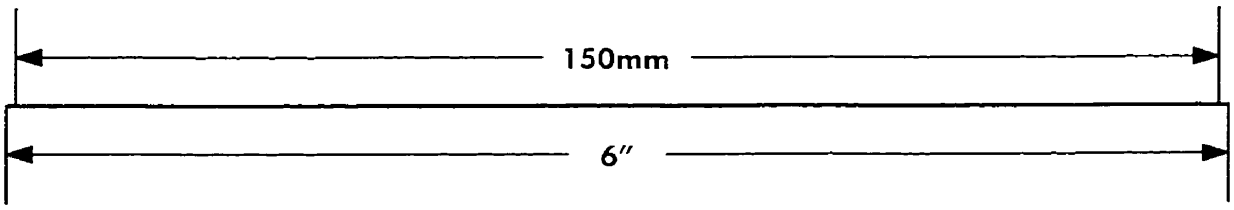
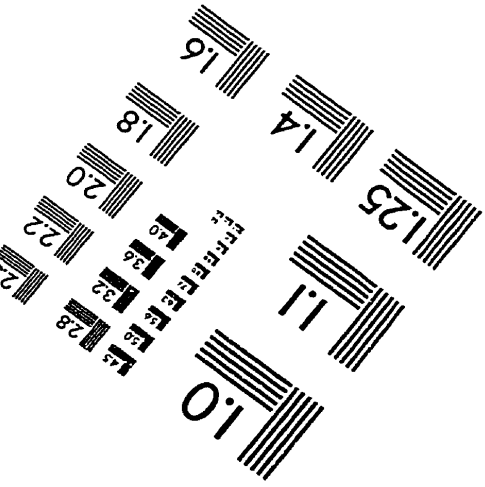
IMAGE EVALUATION
TEST TARGET (QA-3)

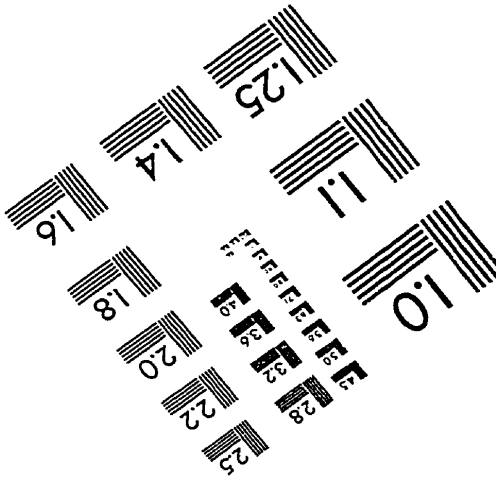












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