The Importance of Sacred Natural Sites for Biodiversity Conservation

Proceedings of the International Workshop held in Kunming and Xishuangbanna Biosphere Reserve, People's Republic of China, 17–20 February 2003

INTERNATIONAL WORKSHOP ON THE IMPORTANCE OF SACRED NATURAL SITES FOR BIODIVERSITY CONSERVATION

Kunming and Xishuangbanna Biosphere Reserve
People's Republic of China
17–20 February 2003

The workshop was organized by:

The United Nations Educational, Scientific and Cultural Organization (UNESCO)

The Man and the Biosophere Programme (MAB)

with support from:

The Chinese Academy of Sciences (CAS)

The Local and Indigenous Knowledge Systems Project (LINKS)

The World Conservation Union (IUCN)

and WWF-Mexico Programme

INTERNATIONAL WORKSHOP ON THE IMPORTANCE OF SACRED NATURAL SITES FOR BIODIVERSITY CONSERVATION

Kunming and Xishuangbanna Biosphere Reserve
People's Republic of China

17–20 February 2003

Proceedings

Volume Editors: Cathy Lee, Thomas Schaaf
Publication Editor and Book Designer: Samantha Wauchope

United Nations Educational, Scientific and
Cultural Organization (UNESCO)

UNESCO-MAB
Proceedings of the International Workshop on
The Importance of Sacred Natural Sites for Biodiversity Conservation
held in Kunming and Xishuangbanna Biosphere Reserve
People's Republic of China
17–20 February 2003

First Published 2003
UNESCO
Division of Ecological Sciences
1, rue Miollis
75352 Paris 07 SP, France
Fax: (33-1) 45 68 58 04
http://www.unesco.org/mab

SC–2003/WS/33

Volume Editor: Cathy Lee
Publication Editor: Samantha Wauchope
Book design and layout by Samantha Wauchope, Fuchsia Inc, Paris
swauchope@fuchsia-inc.com

Table of Contents

SESSION III: PRESENTATIONS OF CASE STUDIES FROM CHINA

WORKSHOP REPORT AND ANNEXES

Preface

There is only one earth, but there are many different worlds. Different worldviews do not only have significant political and socio-economic repercussions but they also determine the way in which people perceive and interact with nature, thus forming their specific culture. Natural ecosystems cannot be understood, conserved and managed without recognizing the human cultures that shape them, since biological and cultural diversities are mutually reinforcing and interdependent. Together, cultural diversity and biological diversity hold the key to ensuring resilience in both social and ecological systems. This explains the involvement of UNESCO, through its environmental sciences and cultural activities, in promoting awareness and understanding of the relationships between biological and cultural diversity as a key basis for sustainable development.

One of these activities involves our work in improving the understanding of the importance of sacred natural sites for biodiversity conservation. In many non-western societies, traditional sacred areas fulfil functions similar to those of legally protected areas in the West. Due to access restrictions, these areas, including mountains, groves, rivers and so forth, are often near-natural ecosystems in otherwise degraded environments. These sites have survived environmental degradation as they are well embedded in local cultures and traditional belief systems. They often provide sanctuaries to rare or endangered species and therefore play an important role as potential gene pools that can be used to restore degraded environments. In many cases, sacred natural sites are also important reference places of cultural identity.

Bearing in mind the interface of biological and cultural diversity, UNESCO initiated and convened an international workshop on "The Importance of Sacred Natural Sites for Biodiversity Conservation", which was held in Kunming and Xishuangbanna Biosphere Reserve (People's Republic of China) from 17 to 20 February 2003. The workshop addressed the basis and methodology for comparative, inter-regional collaboration on biodiversity conservation based on culturally important areas with an emphasis on sacred sites. Current on-going case studies were presented that focused on the traditional mechanisms of environmental conservation in the different regional contexts of Africa, Asia-Pacific and Latin America. The most important outcome of the workshop was expressed by the participants' wish to create an international network of scientists and conservation experts to promote information exchange and in-depth studies on the importance of sacred natural sites for biodiversity conservation. We look forward to assisting the new network as far as possible, and within our mandate and resources.

UNESCO is grateful to IUCN and the WWF-Mexico Programme, the co-sponsoring organizations, for making the workshop happen. In particular we wish to thank Prof. Pei Shengji, Director of the Department of Ethnobotany at the Kunming Institute of Botany of the Chinese Academy of Sciences and his staff as well as the Xishuangbanna Tropical Botanical Garden for organizing and hosting this international workshop and ensuring its thorough success.

W. Erdelen
Assistant Director-General for Natural Sciences
UNESCO

Opening Address by Pei Shengji

Dr. Thomas Schaaf of UNESCO-MAB
Dr. Axel Hebel of UNESCO Beijing Office
Mr. Allen D. Putney of IUCN-WCPA
Distinguished Delegates

Dear Ladies and Gentlemen:

It gives me great pleasure to open this International Workshop on the Importance of Sacred Natural Sites for Biodiversity Conservation, co-organized by UNESCO's Man and the Biosphere (MAB) Programme and the Local and Indigenous Knowledge Systems (LINKS) Project, in collaboration with the Chinese Academy of Sciences, Xishuangbanna Tropical Botanical Garden, the Kunming Institute of Botany, the Chinese MAB National Committee, The World Conservation Union (IUCN), and the Word Wildlife Fund (WWF) Mexico Program Office. On behalf of the workshop organizers, I would like to express my warmest welcome to all the delegates from Mexico, Thailand, Kenya, Japan, USA, Madagascar, Nepal, Indonesia, Australia, Mongolia, and Sri Lanka, and to the UNESCO representatives from Paris, Beijing, and China.

Professor Pei Shengji is the Director of the Department of Ethnobotany at the Kunming Institute of Botany of the Chinese Academy of Sciences

I am very encouraged to be a part of this event, which will serve as a platform to bring together experts from different institutions addressing the very real issues faced by the world community in its challenge to conserve biological diversity and cultural traditions in the context of nature conservation. At the centre of biological and cultural diversity in China, Yunnan offers an ideal venue in which to discuss and observe the issues addressed in this four-day workshop.

Conservation of biological diversity is an issue of global concern. In the past four decades, great efforts have been made by countries and the international community, and in particular, the international organizations UNESCO-MAB, IUCN, WWF-International, and others. Remarkable progress has been achieved in wildlife conservation, the establishment of protected areas, public awareness and education on conservation, among other areas. At the same time, habitat loss, intensive harvesting, urbanization, regional political conflicts and war, bio-invasion, and the ìgreen revolutionî all threaten biodiversity and ecosystems. Warning bells tell us that biodiversity is being lost at the most accelerated rate ever in human history.

Western approaches to biodiversity are beginning to recognize the value of the relationship between local environmental knowledge and community. However, there is little regard for the

conservation potential of sacred natural places, which is in effect an ancient and widespread system of community-based and religiously sanctioned protected areas promoting biodiversity conservation. Government protected areas and community-based protected areas, including various sacred natural sites, should be seen as complementary to modern conservation approaches today. I believe this workshop will serve as a vehicle to address some of our common concerns in this area and will make a significant contribution to conservation target strategies at the global level, while developing a new sphere for effective community conservation.

Finally, I would like to thank LINKS and UNESCO-MAB, represented by Dr. Thomas Schaaf, as well as partner institutions, in providing this wonderful opportunity to meet together, and for their financial support in the organization of this workshop.

I sincerely wish to thank all the distinguished guests and participants for contributing their valuable time to attend this workshop. I wish you all a pleasant time in Yunnan and I hope you enjoy your stay in Kunming and Xishuangbanna.

Thank you for your attention.

Opening Address by Liu Jiang

Liu Jiang is the director of the Division of Science and Culture for the Chinese National Commission for UNESCO

Mr. Chairman, Professor Pei
Distinguished Delegates

Ladies and Gentlemen,

It is a pleasure for me to be invited to join you on the occasion of the opening ceremony of this International Workshop on the Importance of Sacred Natural Sites for Biodiversity Conservation. I note with satisfaction that this workshop brings together many participants from so many institutions, including many experts from abroad. I would like to take this opportunity to extend my sincere thanks to them and to express my warm congratulations on the opening of the workshop.

Through their programmes, UNESCO and its field offices always attach great importance to biodiversity conservation and environmental protection in China. Today, representatives from UNESCO, Mr. Schaaf and Mr. Hebel, are here with us to ensure the success of this workshop. On behalf of the Chinese National Commission for UNESCO, I would like to express my sincere thanks to them. I hope the cooperation between China and UNESCO will be strengthened further.

Ladies and Gentlemen,

His Excellence, Mr. Koïchiro Matsuura, Director-General of UNESCO, said "the identification, preservation and enhancement of sites reflecting our world's natural and cultural diversity can be assured only if governments, local officials, business and particularly the local population work together". Although this sentence was spoken on another occasion, and for another gathering, I think it has the same relevance to the topics we are going to discuss at this workshop. Today, many threats stemming from human activities, such as pollution and poorly managed tourism, are undermining our efforts committed to the preservation of natural cities. What can be done to deal with these problems? I hope that during our discussion some suggestions, proposals and recommendations will be submitted to the workshop.

Ladies and Gentlemen,

The Chinese National Commission for UNESCO, with its newly appointed Secretary-General, Mr. Tian Xiaogang, is willing to join in efforts to coordinate the activities carried out by institutions in China and by UNESCO. Let me briefly describe the commission's function. Our Commission

is currently composed of twenty-eight members representing relevant ministries, bureau, semi-governmental and non-governmental organizations and institutions at national level. Our functions and responsibilities are: to act as a co-coordinating mechanism for participation in various UNESCO activities; to execute some UNESCO activities; and to liaise on all co-operative matters in the fields of education, science, culture, and communication. For about twenty-five years, since its foundation, the commission has maintained a very good relationship with UNESCO and its field offices, including the Beijing Office.

Last but not least, I would like to promise you that our national commission for UNESCO will spare no effort in collaborating with you on the theme of biodiversity conservation. Once again I wish the workshop every success.

Thank you all.

1. UNESCO's Experience with the Protection of Sacred Natural Sites for Biodiversity Conservation

by Thomas Schaaf

Introduction

In many cultures of the world, sacred natural sites are important areas for environmental conservation. Traditional respect for the environment and access restrictions to sacred sites have often led to well-conserved areas with high biological diversity within otherwise degraded environments. The purpose of this paper is to discuss and demonstrate UNESCO's role in environmental conservation at a global scale, and to share UNESCO's experience with regard to the conservation and management of sacred natural sites. The paper also discusses whether an international research forum can be created that focuses studies on the feasibility of establishing the conservation of the environment on cultural values and traditional, land-based belief systems. In using a comparative research approach in various regions of the world, in particular Africa, Asia, and Latin America, such a forum or network could also elucidate the question of whether natural sacred sites can play an important complementary role to legally protected areas such as national parks, strict nature reserves, or forest reserves.

Dr. Thomas Schaaf is Programme Specialist for the Man and the Biosphere (MAB) Programme at UNESCO's Division of Ecological Sciences.

The Man and the Biosphere (MAB) Programme

UNESCO has at its disposal two global instruments that protect many of the world's most important environmental sites: the Programme on Man and the Biosphere (MAB), with its World Network of Biosphere Reserves, and the World Heritage Convention.

Within the framework of the UNESCO Programme on Man and the Biosphere (MAB), the *World Network of Biosphere Reserves* has had tremendous success in recent years and today counts 425 sites in 95 countries (as of February 2003). Biosphere reserves are often considered as appropriate tools to reconcile environmental conservation, sustainable economic development, and research on human environment interactions. In 1995, UNESCO and the Spanish National Committee of the MAB Programme organized an expert conference in Seville, Spain, and elaborated the *Statutory Framework of the World Network of Biosphere Reserves* as well as the *Seville Strategy for Biosphere Reserves.* Article 1 and Article 3 of the *Statutory Framework of the World Network of Biosphere Reserves* provide a definition of biosphere reserves as well as of their functions.

From the Statutory Framework of the World Network of Biosphere Reserves

Article 1:

Biosphere reserves are areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are internationally recognised within the framework of UNESCO's Programme on Man and the Biosphere (MAB), in accordance with the present Statutory Framework.

Article 3:

In combining the three functions below, biosphere reserves should strive to be sites of excellence to explore and demonstrate approaches to conservation and sustainable development on a regional scale:

(i) Conservation — contribute to the conservation of landscapes, ecosystems, species and genetic variation;

(ii) Development — foster economic and human development which is socio-culturally and ecologically sustainable;

(iii) Logistic support — support for demonstration projects, environmental education and training, research, and monitoring related to local, regional, national and global issues of conservation and sustainable development (see UNESCO, 1996a: Biosphere Reserves: the Seville Strategy and the Statutory Framework of the World Network, page 16).

The *Seville Strategy for Biosphere Reserves* recommends using biosphere reserves as "models of land management and of approaches to sustainable development". In particular at the national level, the Strategy suggests establishing, strengthening or extending biosphere reserves "to include areas where traditional lifestyles and indigenous uses of biodiversity are practiced and including sacred sites"(UNESCO, 1996: Biosphere Reserves: the Seville Strategy and the Statutory Framework of the World Network, page 7). Hence, the UNESCO-MAB biosphere reserve concept clearly recognizes the importance of sacred sites and places them into the context of sustainable development.

In this light, UNESCO-MAB implemented a project in Ghana focusing on research, conservation, and management of sacred groves, which promoted sustainable development in the areas surrounding the sacred groves. This project, entitled "Cooperative Integrated Project on Savanna Ecosystems in Ghana" lasted from 1993 to 1997. It was situated in Ghana's Northern Region, a savanna area of the Guinea type marked by widespread environmental degradation such as overgrazing, bushfires, deforestation, agricultural expansion, village sprawl, and road construction. However, small intermittent patches of forests with dense vegetation and closed canopies mark the otherwise open landscape or tree savannah. These are "sacred groves" which have survived the degradation of the environment because of traditional belief systems: as abodes of gods and/or initiation places, they have been respected over the centuries by the Dagomba tribe. Could they provide clues on what the savannah vegetation formation looked like before human impact became too pronounced

in the area? Scientists from the Botany Department of the University of Ghana carried out species inventories in three sacred groves in the area of Tamale, the capital of Ghana's Northern Region. Anthropologists from the Ghanaian Centre for National Culture analyzed the belief systems, which led to the conservation of the sacred groves. Geographers and a team from the Institute for Renewable Natural Resources at the University of Science and Technology in Kumasi looked into the overall land use system so as to develop an integrated land-management system that would allow for the continued conservation of the sacred groves as well as the sustainable development of the area in an integrated manner.

All studies were carried out with the prior consent of the local communities concerned — in particular, the consent of village chiefs, community elders and priests. Some of the fetish priests were also traditional healers who had a wealth of traditional medical and ecological knowledge and who were also keen to learn of modern plantation techniques, as some of the medicinal plants used in traditional medicine are becoming rare and more difficult to find.

Based on the expressed needs of the local communities, afforestation using cash crops (cashew nuts, mango trees, teak) was carried out around the sacred groves. Fodder banks, woodlots, and tree nurseries were established as a sort of "buffer zone" around the sacred groves, providing additional natural protection to the sacred grove itself. In particular, women were trained in planting techniques so that they could earn their own income.

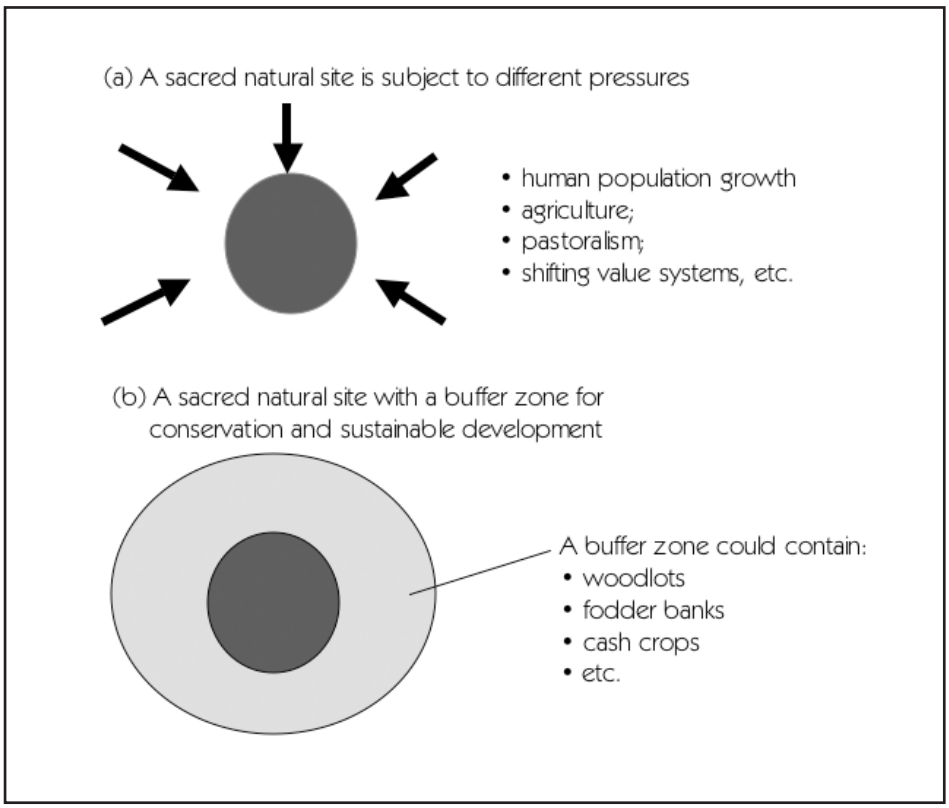
The project met with tremendous success: it was filmed by the Ghana Broadcast Corporation and diffused nationally, informing viewers about environmental protection activities that are based on cultural values. In the meantime, national and international scientists visited the area to learn from the pilot project, witnessing how local communities have taken a strong interest in preserving their sacred places and the environment.

A number of important lessons and conclusions about the conservation and management of sacred natural sites resulted from this project:

- *A sacred natural site is an important element linking nature and culture;*
- *A sacred natural site is often an anchor for cultural identity;*
- *A sacred natural site can constitute an effective means for environmental conservation as it is embedded in local and traditional belief systems;*
- *Sacred natural sites have great value for conservation ecology, for example:*
  - *as areas of high biological diversity;*
  - *as sanctuaries for rare or threatened species;*
  - *as sites that protect freshwater sources;*
  - *as indicator sites showing potential natural vegetation in areas subject to environmental degradation (important for the restoration and rehabilitation of degraded ecosystems).*

However, it is also important to emphasize that cultural values are dynamic and can change tremendously over time. Traditional belief systems can also change, resulting in the abandonment of sacred natural sites and relinquishment of their associated protection by local communities,

particularly when younger people are compelled to till the land so as to make a living. In such situations, the conservation of sacred natural sites can be greatly enhanced by establishing "buffer zones" around the sacred site itself. These zones can then help to promote sustainable development, as demonstrated in the figure below:



In the case of the project in Ghana, the buffer zones that were created around the sacred groves contained teak plantations and fodder banks, as well as cash crops such as mango and cashew nuts. The cash crops proved to be particularly successful with women, who obtained a steady income from the plantations, which in turn reduced the pressure on the sacred groves themselves.

The World Heritage Convention

In 1972, the UNESCO General Conference adopted the *Convention Concerning the Protection of the World Cultural and Natural Heritage* (the World Heritage Convention). To date (February 2003), 176 States Parties adhere to the Convention, making it one of the most universal international legal instruments for the protection of cultural and natural heritage. In essence, the Convention recognizes that there is a set of places that are of such outstanding universal value that their deterioration or destruction

constitutes a loss to the heritage of all humanity, and not just to the country in which they are located. These cultural and natural places make up the world's heritage. Currently, the World Heritage Committee has inscribed 730 properties on the World Heritage List, of which 144 are natural sites (such as, for example, Ecuador's Galapagos Islands), 563 are cultural sites (an example is the Taj Mahal in India), and 23 are mixed cultural and natural sites (the historic site of Machu Picchu in Peru). As regards natural sites, *Article 2* of the Convention stipulates that:

"For the purposes of this Convention, the following shall be considered as "natural heritage":

- *Natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view*
- *Geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation*
- *Natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty (see UNESCO: Convention concerning the protection of the world cultural and natural heritage, adopted by the General Conference at its 17th session, Paris, 16 November 1972)*

Reflecting an important conceptual development with regard to heritage sites, in 1992 the World Heritage Committee adopted cultural landscape categories, which paved the way for the international recognition of sacred natural sites. The Operational Guidelines of the convention (an explanatory text to the convention providing detailed information on the specific criteria for the selection of world heritage sites) stipulates in paragraph 39 (iii): "The final category is the associative cultural landscape. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent."

On the basis of this paragraph, it was possible to nominate Tongariro National Park in New Zealand as a cultural landscape in 1993. In fact, Tongariro National Park had already previously been listed as a natural world heritage site, but only on the grounds of its "natural and environmental values". The earlier listing of Tongariro had completely ignored the fact that Tongariro was the most sacred area for New Zealand's Maori population. It was the Maoris themselves, with good reason, who insisted that this reductionist view be expanded by renominating Tongariro for its value as an associative cultural landscape, expressing the religious and cultural associations the Maori have with the area. Accordingly, Tongariro became the first sacred site to be nominated as a cultural landscape under the World Heritage Convention.

UNESCO'S WORK IN THE CONTEXT OF SACRED NATURAL SITES

Both the World Network of Biosphere Reserves and the World Heritage Convention aim for the sustained conservation of the environment in a global and intergovernmental manner. UNESCO is therefore interested in further exploring ways to promote environmental conservation, while at the same time trying

to satisfy the economic and spiritual needs of people who live in or near protected areas. How can environmental conservation be rendered sustainable without violating perceived and real requirements of people inhabiting an area since time immemorial? Can cultural values and traditional belief systems, which respect the environment, be a more powerful or at least an equally powerful means to conserve nature than legally protected areas? Such an approach appears promising in many traditional societies of the world where the concept of a "sacred nature" is well embedded in societal norms.

In order to find answers to some of the above questions, UNESCO has already organized a number of international workshop, seminars, and symposia in which experts from all the world's regions have participated. One such workshop took place under the auspices of the UNESCO-New Delhi Office in Peechi (State of Kerala, India) in 1997 on the topic "The role of Sacred Groves in Conservation and Management of Biological Diversity" and led to a publication entitled *Conserving the Sacred for Biodiversity Management*.

In September 1998, UNESCO, in cooperation with the French *Centre national de la recherche scientifique (CNRS),* organized an international symposium at UNESCO Headquarters in Paris, which was attended by some two hundred participants. Three years later, in September 2001, the UNESCO World Heritage Centre and the Japanese Agency for Cultural Affairs organized a thematic expert meeting on Asia-Pacific sacred mountains in Wakayama City (Wakayama Prefecture, Japan) that led to the publication of a final report containing important recommendations with regard to the definition and management of sacred mountains in the Asia-Pacific regional context.

This international workshop in Kunming and Xishuangbanna Biosphere Reserve continues the series of various events organized by UNESCO to discuss among scientists and policy-relevant decision-makers the advantages and constraints of sacred natural sites for biodiversity conservation. It is striking to note that similar land-based belief systems exist throughout Africa, Asia-Pacific, and Latin America, where the protection of nature is part of the traditional norms of a society. The question that should be of relevance to this workshop is whether culturally important natural sites in Africa, Asia-Pacific, and Latin America can enhance both environmental conservation and socio-cultural integrity. Moreover, is it possible to use natural sacred sites as indicator sites for potential natural vegetation thus fostering the rehabilitation of degraded areas using sacred places as reference sites? Can we create an international network of scientists and custodians of sacred natural sites to work together with a view to better understand the mechanisms for culture-based environmental conservation and to formulate guidelines for decision-makers for the enhanced protection of these sites? Such a network would include scientific research (with the participation of both natural scientists and cultural anthropologists), but would endeavour to promote sustainable development in the context of conserving the environment and preserving cultural identities.

One overriding question is whether environmental conservation can be based effectively on cultural values and traditional belief systems. One would also have to look into the question of whether such an approach is "sustainable" in today's world, especially in the light of changing societies and cultures, and globalization processes.

Natural scientists would need to inventory and study the plant and animal composition in natural sacred sites. Often considered as vestiges of original vegetation areas and animal habitats, one would have to investigate whether natural sacred sites could be used as reference sites for potential natural vegetation in an area suffering from environmental destruction. In areas where little, if any, original vegetation is left "untouched", natural sacred sites could eventually give an idea of the area's climax or sub-climax vegetation. Possibly, the sacred sites could serve as gene pools to restore stressed or degraded environments, using reforestation measures.

Anthropologists may be interested in studying the interrelationships between people and their environment and the manifestation of spiritual powers in nature. Can sacred sites, as reference sites for community oriented development activities, combine traditional cultures and "modern development"? Is there a difference in environmental awareness between the "sacred place" and the "non-sacred place"? The (re)valorization of traditional ecological knowledge and traditional resource use in the light of combating land degradation and restoring soil fertility will be a very important development component of the project.

Natural sacred sites occur in a variety of ecosystems and landscapes: in many cultures of the world, mountains are considered as sacred, as are the sources of water — rivers and lakes. Deserts, forests/groves, islands and caves are often considered sacred as well. The network should consider sacred natural sites in different environmental settings so as to learn more about culture-nature relationships.

Study sites could be selected from world heritage sites and biosphere reserves, but also from sites that have no legal protection in the modern sense. Over the past few years, UNESCO has been in contact with researchers carrying out studies in the following sacred areas and countries that could form the nucleus of such a network:

- *Africa: rivers with sacred catfish at Zagné in southwestern Côte d'Ivoire; sacred groves in northern Ghana; Kaya coastal forests in Kenya, Tsjinjoarivo ancestral burial grounds in Madagascar*
- *Asia: Changbaishan and Xishuangbanna biosphere reserves in China; Agathyarkutam sacred landscapes in the Sikkim area of India; sacred groves in India's Ratnagiri District; sacred groves in south-eastern India; Adam's Peak in Sri Lanka*
- *Latin America: northern Atacama desert in Chile; Sierra Nevada de Santa Martha biosphere reserve in Colombia; sacred pilgrimage routes of the Huichol in Mexico; and Huascaran World Heritage Site and Biosphere Reserve in Peru*

UNESCO is ready to provide its support in making such a network function. It would hopefully place all interested participants in a position to help formulate policy guidelines for government authorities, which would aim at conserving the environment and respect traditional practices and cultural identities at the same time.

References

Ramakrishan, P. S., K. G. Saxena, and U. M. Chandrashekara, eds. 1998. *Conserving the Sacred for Biodiversity Management*. New Delhi: Oxford & IBH Publishing; Enfield, New Hampshire: Science Publishers Inc; in association with UNESCO.

Schaaf, T. 1994. Heilige Wälder für den Natur- und Umweltschutz. *UNESCO heute*, 41st year, no. II: 181–183.

———. 1996. Sacred Groves — Environmental Conservation Based on Traditional Beliefs. In *Culture and Agriculture,* World Decade for Cultural Development Series. Paris: UNESCO.

———. 1997. "Umweltschutz durch Kultur". *UNESCO heute,* 44th year, no. III: 73–75.

———. 1998. Sacred Groves in Ghana: Experiences from an Integrated Project. In *Conserving the Sacred for Biodiversity Management*, edited by P. S. Ramakrishnan, K. G. Saxena, and U. M. Chandrashekara. New Delhi: Oxford & IBH Publishing; Enfield, New Hampshire: Science Publishers Inc; in association with UNESCO.

UNESCO. 1992. *Convention Concerning the Protection of the World's Cultural and Natural Heritage.* Adopted by the General Conference at its 17th session, Paris, 16 November 1972.

———. 1994. Co-operative Integrated Project on Savanna Ecosystems in Ghana (CIPSEG). In *Final Report on the Symposium on Science and Technology in Africa, Nairobi, Kenya, 14–15 February 1994.* Paris: UNESCO, 95–99.

———. 1996a. *Biosphere Reserves: the Seville Strategy and the Statutory Framework of the World Network*. Paris: UNESCO.

———. 1996b. *Terminal Report on the "Co-operative Integrated Project on Savanna Ecosystems in Ghana".* Paris: UNESCO, Serial no. FMR/SC/ECO/96/209-FIT.

UNESCO World Heritage Centre, Agency for Cultural Affairs of Japan, and Wakayama Prefectural Government. 2001. *Final Report of the UNESCO Thematic Expert Meeting on Asia-Pacific Sacred Mountains.* Meeting held in Wakayama City, Japan 5–10 September 2001. Tokyo: UNESCO.

2. UNESCO's Environmental Sciences Activities in Northeast Asia: A Brief Overview

by Axel Hebel

Introduction

Dr. Axel Hebel is a Programme Specialist in the Science, Technology and the Environment sectors at UNESCO Beijing

Promoting capacity building in the environmental sciences is a priority of UNESCO Beijing Office's Natural Sciences activities in the Northeast Asian sub-region, a region that comprises the People's Republic of China, Mongolia, the Democratic People's Republic of Korea, the Republic of Korea, and Japan. UNESCO is undertaking a variety of activities within the framework of its intergovernmental science programmes. Programmes include:

- *The Man and the Biosphere Programme (MAB)*
- *The International Hydrological Programme (IHP)*
- *The International Geological Correlation Programme (IGCP)*
- *The Intergovernmental Oceanographic Commission (IOC)*

Combating desertification and environmental disaster reduction, *inter alia,* are other activities of importance. Extra-budgetary projects such as ERSEC (Ecological Research for Sustaining the Environment in China) complement our natural sciences programmes and projects funded through UNESCO's regular programme and by member countries. UNESCO's UNISPAR (university-industry-science partnership) programme promotes university-industry-science partnerships in China: many of the industry-sponsored activities are related to environmental sciences.

1. UNESCO-MAB Activities in Northeast Asia

1.1 The East Asian Biosphere Reserve Network (EABRN)

UNESCO facilitates regional networking initiatives such as the East Asian Biosphere Reserve Network (EABRN), which covers the Northeast sub-region and the Russian Federation. The network comprises forty-five biosphere reserves. It was launched in 1995 and has received generous financial support from the Government of the Republic of Korea.

UNESCO Beijing Office has hosted the EABRN Secretariat since the beginning of this year (from 1995 until 2002 the secretariat was hosted by UNESCO Jakarta Office). Past EABRN meetings have been held in Ulaanbaataar, Mongolia, in August 1997; in Jiuzhaigou, China, in September 1999; and in Vladivostok, in the Russian Federation, in September 2001. The next meeting will be held in

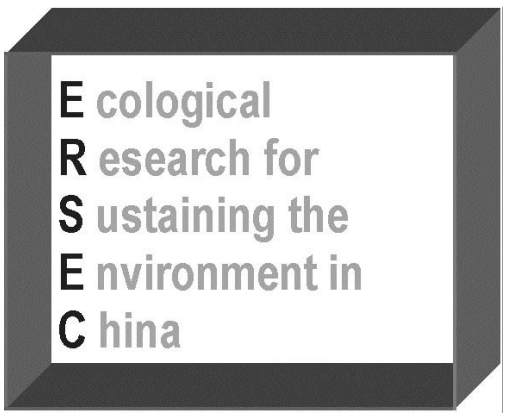
Hustai Nuuru Biosphere Reserve, Mongolia, from 17-23 August 2003. The EABRN´s major thematic focus is on policy studies, transboundary cooperation, and ecotourism.

1.2 MAB China

The Chinese National Committee for MAB carries out and promotes activities of the China Biosphere Reserve Network (CBRN), which is composed of twenty-two UNESCO Biosphere Reserves and a large number of other nature reserves in China. The CBRN is a national network that provides a platform for workshops, training courses, policy studies, and international cooperation.

The Chinese National Committee for MAB, in cooperation with its various partners, has attached great importance to carrying out detailed case studies in biosphere reserves in China. An example is the *Study on the Management of Degraded Ecosystems in Xilingol Biosphere Reserve*, published in 2001. Follow-up activities in this regard are under way in Xilingol. As part of the interregional project "Asia-Pacific Cooperation for the Sustainable Use of Renewable Natural Resources in Biosphere Reserves and Similarly Managed Areas" (ASPACO), financed by the government of Japan, various activities have been carried out in coastal biosphere reserves such as Shankou, Yancheng, and Nanjilie Islands, with the objective of fostering community participation and effective biosphere-reserve management.

2. Sustaining the Environment in China (ERSEC)



Ecological research plays a key role in developing measures to protect the environment in a sustainable way alongside rapid economic progress. The UNESCO umbrella project "Ecological Research for Sustaining the Environment in China" (ERSEC) was launched in June 2002 as a joint initiative between UNESCO's Beijing Office, the Chinese Ministry of Education, and the German Ministry of Education and Research. The German government funded the project. ERSEC does not conduct research of its own, but provides existing Sino-German ecological research projects with a platform for an interdisciplinary exchange with other scientists and relevant political decision-makers. Moreover, it links bilateral research cooperation with other multilateral initiatives.

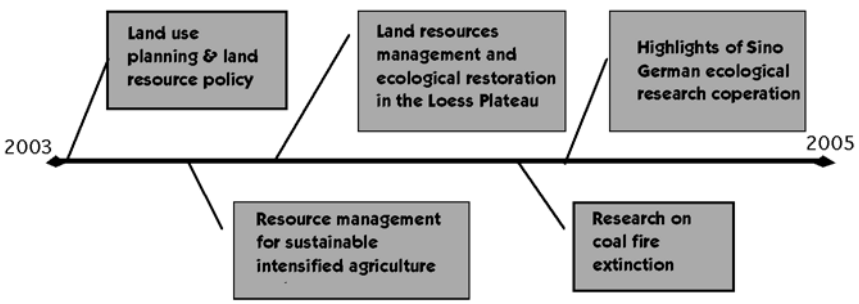
ERSEC conferences have resulted in a series of books on various environmental and ecological issues in China — ranging from intensive sustainable agriculture to coal-fire prevention. ERSEC is also committed to disseminating such research results and promoting practical applications of research findings.

The ERSEC Ecological Umbrella Project

2.1 The ERSEC Ecological Umbrella Project

Sino-German Bilateral Research Projects under the ERSEC umbrella include:

- *Environmentally Compatible and Sustainable Agriculture on a High Production Level in the Northern China Plains (Hohenheim University and the Chinese Agricultural University, Beijing)*
- *Sustainable Integrated Land-Use Planning (Stuttgart University and the Jiangsu Development Planning Commission)*
- *Concepts for Sustainable Land Use in Coastal Areas in Eastern China (Dresden University and Zhejiang University)*
- *Combating Soil Erosion and Promoting Agro-forestry in the Loess Plateau of Central China (Technical University of Munich and Yangling University)*
- *Coal Fire Research — Innovative Technologies for Exploration, Extinction, and Monitoring of Coal Fires in Northern China (the German Aerospace Centre and the Chinese National Remote Sensing Centre)*



ERSEC Conference Topics

3. University-Industry-Science Partnership (UNISPAR)

The University-Industry-Science Partnership (UNISPAR) programme promotes university participation in the economic process of developing countries and countries in transition. Under its auspices, university professors, researchers from public and private institutes, engineers, managers and government officials work together on technological and socio-economic aspects of sustainable

industrial development. Protection of the environment is of prime concern to such initiatives. UNISPAR also promotes partnerships between universities and industry towards the retraining of engineers and administrators (continuing education) and towards finding effective ways and means to improve the transfer of research results to industry.

3.1 UNISPAR's UNESCO Chairs

A number of UNESCO Chairs have been created in China through the UNISPAR programme. Several examples are listed below:

- *UNESCO Chair of Continuing Engineering Education — Tsinghua University, Beijing*
- *UNESCO/UNU Chair of Plant Biotechnology — China Agricultural University, Beijing*
- *UNESCO/UNIDO Chair of Clean Coal Technology — China Coal Research Institute, Beijing*
- *UNESCO/Mitsubishi Chair of Thermal Power Generation — Northwest Polytechnic University, Xi'an*
- *UNESCO/Toyota Chair of Environmental Management — Nankai University, Tianjin*
- *UNESCO/Shell Chair of Coal Gasification — Chinese Academy of Sciences, Taiyuan*
- *UNESCO/EOLSS Chair of Technology Policy — Zhongsha University, Guangzhou*
- *UNESCO/Shimano Chair of Cold Forging Technology — Jiaotong University, Shanghai*
- *UNESCO/Fraunhofer Chair of Information Technology for Industry and Environment — Tsinghua/Chinese Academy Engineering, Beijing*
- *UNESCO Chair of Sustainable Urban Water Management — Beijing University, Beijing (under development)*
- *UNESCO Chair of Ecotechnie — Yunnan University, Kunming (under development)*

4. Sacred Natural Sites

Sacred Natural Sites are important in various ways. They are valuable in terms of environmental preservation as well as from a cultural perspective. The potential for well-managed (and preserved) sacred sites to act as models may be important for improved land-resources management and bio-diversity conservation, both at sites adjacent to sacred sites and further afield.

UNESCO Beijing Office welcomes the opportunity to collaborate with the international network of experts on Sacred Natural Sites. UNESCO Beijing Office is committed to ensuring that MAB, ERSEC, UNESCO Chairs and other relevant programmes and projects take adequate account of Sacred Natural Sites.

3. IUCN's Perspective for the World Parks Congress

by Allen D. Putney

Introduction

Let me begin by welcoming you to this workshop on Sacred Natural Sites here in Kunming, China, and I wish to thank you for taking time from your regular functions to join us.

IUCN's World Commission on Protected Areas, as one of the co-organizers of this workshop, along with UNESCO, is particularly pleased to see this event come to fruition. It is one of the first concrete actions to emerge from the collaboration of UNESCO, ICUN, and WWF Mexico on the theme of sacred natural sites. We sincerely hope that this will be the first of many thematic activities on sacred sites and that we will be joined by other organizations in promoting an international initiative.

Allen D. Putney serves as Leader of the Task Force on Non-Material Values of the IUCN World Commission on Protected Areas.

Background

IUCN — The World Conservation Union, is an international organization with governmental and non-governmental members from around the world. The World Commission on Protected Areas (WCPA) is one of six technical commissions of the IUCN bringing together experts on a voluntary basis who work to promote different aspects of the conservation movement worldwide.

As leader of the WCPA Task Force on Non-Material Values I am based in the United States; Mercedes Otegui, co-leader of the Task Force, who is based in Mexico, joins me here today. The purpose of the Task Force is to collect and analyze experience from around the world to form the basis for developing guidelines and building capacity for the inclusion of non-material values as an integral element of management programs for protected areas.

The Task Force members have selected sacred natural sites as a theme of particular interest, and have developed a specific project to further this work. The Ford Foundation has generously provided a grant to implement this project, which focuses on five basic components:

1. *Development of case studies on sacred natural sites (SNS), which will provide background information based on experience with management of areas in various parts of the world.*
2. *Analysis of case studies and other experiences to identify preliminary technical and legal guidelines for management.*
3. *Synthesis of a pre-feasibility study for the development of a network of protected areas along the Great Inca*

Highland Road, which passes through sacred landscapes of indigenous and traditional communities inhabiting the upper elevations of the Andes Mountains in six South American countries.

4. *Review of the case studies, pre-feasibility study, and proposed guidelines at the World Parks Congress (Durban, September, 2003).*
5. *Presentation of a Special Ceremony at the World Parks Congress to communicate the sacred dimension of protected areas as perceived by indigenous and traditional peoples.*

Outputs from the Workshop

From IUCN´s standpoint, this workshop comes at a crucial moment. The presentations made here will provide the basis for case studies on sacred natural sites (SNS) that can be presented and analyzed at the World Parks Congress this September. It also provides the opportunity to discuss the strengths, weaknesses, threats, and opportunities of SNS in terms of their value for the preservation of the natural and cultural heritage associated with them. These inputs will in turn provide the basis for developing a first preliminary set of technical and legal guidelines for the management of SNS that can then be discussed and improved at the World Parks Congress.

We would also like to take the timely opportunity presented by this workshop to obtain advice from you, the participants, on how we should ideally proceed on several fronts. We are particularly concerned about how to present a unique special ceremony on indigenous and traditional peoples' relationship with nature, which is not a characteristically folkloric show. We would also like to explore avenues in which we can develop a more formal approach to further the initiative on sacred natural sites with other institutional partners. Finally, we welcome your suggestions on how to organize the technical sessions at the WPC that will address the SNS theme. We would like to particularly outline the need to concentrate ample time on discussion and analysis rather than on individual presentations. We look forward to discussing these points with you.

Conclusion

The following days will provide us with the opportunity to better know each other and our various experiences with regard to SNS. However, equally important will be the opportunity to analyze our experiences in order to find common ground and to identify the differences. We are particularly grateful to our hosts from China who have so kindly provided us with this opportunity to work together and also to share their particular experiences with SNS. Many thanks to them, and to all of you, for making this workshop possible.

4. The Sacred Mijikenda Kaya Forests of Coastal Kenya and Biodiversity Conservation

by Anthony N. Githitho

1. Biodiversity Conservation at Sacred Sites

Anthony N. Githitho represents the Coastal Forest Conservation Unit (CFCU) of the National Museums of Kenya association

The *Convention on Biological Diversity*, adopted at the 1992 Earth Summit in Rio de Janeiro, acknowledged the need to protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements (Article 10). A number of international gatherings have since been held in relation to this issue, such as the 1998 UNESCO symposium on "Sacred sites, Cultural Diversity and Biological Diversity". They reflect a growing realization of the importance of sacred sites as a component of protected area networks.

A commonly asked question is whether environmental conservation can be based effectively on cultural values and traditional belief systems. Studies on this theme have been carried out by various organizations. Though the field is comparatively new, it is possible to make some general observations about natural-resource conservation at sacred sites from the experiences of individuals and organizations working in this area. One such organization is the Coastal Forest Conservation Unit of National Museums of Kenya, involved in the conservation of Kenya's Mijikenda Kaya forests.

2. The Mijikenda Kaya Forests

The sacred Kaya Forests are situated on the coastal plains and hills of Kenya, East Africa. They are residual patches (from ten to two hundred hectares) of once-extensive diverse lowland forest of Eastern Africa occurring within the Zanzibar-Inhambane Regional Mosaic (UNESCO classification). The Kaya forests are botanically diverse and have a high conservation value, as determined by a number of surveys; two surveys worth mentioning were undertaken by the National Museums of Kenya (NMK), both funded by World Wide Fund for Nature (WWF). More than half of Kenya's rare plants are found in the coastal region, many in the Kayas.

Working in conjunction with the local communities of those areas, over fifty Kaya forest patches have been identified in the contiguous Kenyan coastal districts of Kwale, Mombasa, Kilifi, and Malindi.

2.1 Mythical / Historical Origins

The Kayas would seem to owe their existence to the beliefs, culture, and history of the nine coastal Mijikenda ethnic groups. These are: the Giriama, Digo, Duruma, Rabai, Kauma, Ribe, Jibana, Kambe,

and Chonyi. According to their oral traditions the forests historically sheltered small fortified villages of the various groups when they first appeared in the region ten generations or more ago ('Kaya' means homestead). They took refuge in the forest settlements from the onslaught of nomadic tribes such as the Orma or Galla, who had driven them from their former settlements north of Tana, in what today is Somalia. The Mijikenda maintain that as conditions became more secure, particularly since the late nineteenth century, the villagers began to leave their forest stockades and clear and cultivate away from them. They spread and occupied many of their current locations, which usually include a Kaya, or historical settlement, as a nucleus or focal point.

This traditional account of local history appears to be a blending of myth and probable fact, as the individual Kaya sites can be clearly identified by local communities, often marked by forest clearings with paths and other signs of historical usage. Records from the early twentieth century indicate that some Kayas were settled at that time, and the ravages of the Galla along the East African coast are well documented. Archaeological excavations of some localities, however, seem to point to even longer continued occupation of the sites than the legends suggest; hence the question of their origins may be more complex. In any case, many Kayas were preserved as sacred places and burial grounds by the Mijikenda, led by their ritual Elders. Cutting of trees and destruction of vegetation around these sites was prohibited in an attempt to preserve the surrounding "Kaya forest" as a screen or buffering environment for the Kaya clearings. While the surrounding areas were gradually converted to farmland, the Kaya sites remained on the coastal landscape as forest patches of varying size and ritual significance.

2.2 Traditional Protection Systems Used in the Kayas

The concept of "sacred" in most societies implies something set apart, holy or revered. It is often associated with the secret or forbidden. The main objective of the traditional management of sacred sites is to maintain their separateness or sanctity by controlling access to them. This is achieved largely through the strength of spiritual beliefs and social rules and norms. Active physical policing of sacred places by custodians has tended to be more the exception than the rule. More commonly, taboos and other religious observations have been applied, regulating access and conduct at the sites, threatening dire punishment from the spirit world for those who flouted the rules. These have proven fairly effective in reinforcing self-restraint among individual members of the group. If a breach does occur, purposely or not, intervention or intercession by spiritual leaders would be required to ward off harm to the trespasser. The Kaya communities conform to this pattern.

The most important part of the Kaya forest traditionally was the *Kaya* itself, the central clearing; in a metaphorical and literal historical sense, the "home" of the community. This tended to be set at the centre of the forest. The *Kaya* was approached from only a few well-trodden and defined paths. It was unlucky to use any other route. Historically, use of any other trail but these paths and gates signified bad faith and enmity, and was met with hostility from the inhabitants of the Kaya. At a secret spot near the central clearing the *Fingo* is buried, a powerful protective talisman of the

tribe which came from their original home in the north. Burial sites were also associated with the central clearing, where generations of villagers were buried: their spirits still reside here. The graves of great leaders were kept somewhat apart and are also treated as shrines. Certain old trees and unusual landforms such as caves also have ritual importance.

As mentioned earlier, the cutting of trees and other activities that could potentially cause damage to the forest around the Kaya and sacred spots was strictly forbidden by the Kaya Elders. This included collecting or removing dead logs or twigs or any other forest material. One kept to the traditional paths and avoided wandering freely in the forest — trampling vegetation and disturbing secret sites — and grazing livestock in the forest was forbidden. Uncommon animals, particularly large snakes, were to be left alone if encountered. Any structures built for ritual purposes used materials from the Kaya forest. In addition to these restrictions on physical interactions at the site, there were behavioural controls as well; designed to maintain the tranquillity of the Kaya. They emphasized decorum and respect as well as control of physical and emotional passions. Blood was not to be shed within the Kaya under any circumstances. However, all members of the Kaya community, including women, were entitled to visit the site if they so wished, as well as using the site under the Elders' guidance for ritual and ceremonial purposes

The penalty for infringement varied depending on the magnitude of the transgression, but it usually consisted of fines of livestock or fowl, which were then sacrificed to appease offended spirits. If the offence was committed secretly, it was believed it would come to light sooner or later when attempts were made by healers to investigate the root cause of an illness or other misfortune which would surely befall the culprit. In such a case, he or she might, out of guilt, be persuaded to make a full confession.

These "spiritually policed" regulations regarding acceptable and profane behaviour within the Kaya sanctuary relating to physical disturbance of the sites, including cutting and removal of forest material, have proven valuable in terms of conservation, as they preserved the forest vegetation of these sites. However, traditional systems of protection of sacred sites rely heavily on the presence of a homogenous ethnic or cultural community sharing similar values and experiences, on a strong shared belief in the spirit world and its pervasive influence in people's lives, and on a common acceptance of religious and cultural authority figures associated with the sites.

2.3 Biodiversity Value and Threats to the Kayas

That sacred sites have been important for biodiversity conservation all over the world is a demonstrated fact. Botanical surveys of coastal forests in Kenya over a number of years now have provided and continue to unearth rare and interesting plant species in the Kaya forests. These sacred forests are the only known location of certain plant species. This is because the Kayas form part of the complex mosaic of rich Eastern African coastal forests.

The Eastern African coastal forests have been described as a heterogeneous group of isolated evergreen or semi-evergreen closed-canopy forests within sixty kilometres of the Indian Ocean

and usually on low hills rising to not more than six hundred metres. They stretch from Southern Somalia in the north through Kenya and Tanzania to Northern Mozambique in the south, and are part of White's "Zanzibar Inhambane Regional Mosaic" (White 1983). They are regarded as important for biodiversity conservation globally, a conclusion drawn from the accumulated findings of scientific surveys and research in the region over many years.

According to Burgess et al. (1998), the proportion of endemic species in these forests is consistently high for all species groups. Examples are: millipedes (around 80 percent of those found in the Kayas are endemic), molluscs (68 percent are endemic, or 86 species), forest reptiles (51 percent endemic, 24 species), Vascular plants (37 percent endemic, 554 species), and birds (10.5 percent endemic, 9 species). In total, 782 species in eight biological groups are strictly endemic to the coastal forests. The significance of these figures increases when the comparatively small area encompassed by these forests is considered. Some would rank the Eastern African coastal forests among the ten top-priority ecosystems on the African continent in terms of biodiversity conservation; together with the eastern arc forests they have been included among the two hundred global priority "ecoregions".

Most coastal forests present at least one endemic species. However, there are areas where species endemism occurs in much higher concentrations, such as the Lindi local centre in Tanzania and the "Usambara-Kwale" local centre of endemism — which includes the Kaya forests.

Table 1: *The seven Kayas included on Robertson and Luke's list of the twenty coastal forests with the highest conservation value in Kenya (source: Robertson and Luke 1993)*

.

Note: *"Rare" species include those that are rare in a world sense (found in fewer than five localities, all in CFS areas), and those that are rare in Kenya (found in fewer than five localities in Kenya but may occur elsewhere).*

Kaya	Forested area (app)	No. of species	% Rare species
Jibana/ Pangan	250 ha	354	19.8
Kinondo	30 ha	112	14.3
Dzombo	295 ha	361	10.0
Kivara	130 ha	170	3.5
Muhaka	130 ha	278	9.0
Mrima	290 ha	271	9.2
Rabai	850 ha	425	4.7

As part of this system, the Kayas present a high diversity of species: this has particularly been documented for plants. Among the outputs of the National Museums of Kenya, WWF-supported, Coast Forest Survey (CFS), undertaken from 1988 to 1991, was a checklist of all known vascular plants of the coastal districts, including forest flora. An analysis of the data underlined the conservation importance of the Kayas despite their comparatively small area. Using a measure of relative conservation value '*vt*' developed by the CFS, combining the known geographic range of a species and its rarity values, seven out of the twenty sites with the highest '*vt*' in coastal Kenya were Kaya forests (Robertson and Luke 1993).

According to latest estimates, the total area covered by Kayas and related forests is roughly six thousand hectares, or about 10 percent of Kenya's remaining coastal forest. The disproportionately large number of rare plants recorded for the Kayas may, among other things, be a reflection of ecological variation, as Kaya forests cover a very broad range of habitat and micro-climatic conditions: increasing the number of species likely to be represented within these fragments.:

2.4 Loss of Kaya Forests and Biodiversity

Over the past three or four decades there has been a decline in knowledge about and respect for traditional values in these areas, due to economic, social, cultural, and other changes in society. This has been combined with a rising demand for forest products and land for agriculture, mining, and other activities due to the increased population. One result has been the destruction and loss of the small Kaya forests and groves. By the time an active conservation programme began to be implemented for the Kayas in the early 1990s, the sacred forests had suffered considerably.

As an extreme example, local agricultural encroachment has reduced forest cover in Kaya Chonyi, the sacred forest of the Chonyi Mijikenda group, to a fifth of its original area. Encroachment has also diminished other Kayas in size to varying degrees, particularly along Kenya's north coast (such as Kaya Jibana, Kaya Rabai, and Kaya Kambe). These sites are in fairly fertile areas with relatively dense populations. They have also been logged for valuable hardwood timber, and some species of these trees have disappeared altogether. Along the south coast, the Digo Kayas, which occur along beach areas, have fallen prey to intensive hotel development and planned settlement schemes.

2.5 State Protection of the Kaya Forests

In response to this situation, from 1992 the Kenyan government began to recognise a number of these forests as national monuments under Kenya's Antiquities and Monuments Act. To date, a total of forty of forty-seven proposed sites have been officially recognised under this act. National Museums of Kenya (NMK) is the state authority responsible for the conservation and management of national heritage. The Coastal Forest Conservation Unit (CFCU) was formed in 1992 within the NMK, with the task of caring for the Kayas in collaboration with local communities. CFCU undertakes conservation activities for the Kayas with support from donors, particularly the World Wide Fund for Nature (WWF).

2.6 Conservation Strategies Applied to the Kayas

For conservation of the Kayas to be successful, an attempt must be made to address the problems and destructive trends mentioned above as far as possible. Below are cited some activities undertaken by NMK/CFCU and other partners to protect the Kaya forests, as well as some of the issues and lessons learned.

PARTNERSHIP

Partnership between local communities and external bodies seems to be important for Kaya conservation. An example is collaboration between communities and NMK. This partnership, with the additional resources that it often brings, has helped to compensate significantly for the weakening of traditional protection systems due to social, cultural, and demographic changes in local communities. Through this collaboration it has become possible, for example, to provide for the deployment of local volunteer guards for sacred sites in some instances where the traditional religious and cultural systems no longer hold sway. Such a system requires at least a modest amount of money, which those involved in the partnership must be able to raise.

Partnerships with the state and other agencies are also important to protect the sites from destruction and interference that may originate at some distance from the Kaya. Often the commercial agents involved in damaging forest sites are too politically powerful and well equipped with resources for local community groups to resist, thus a strong conservation partner provides a significant advantage.

EDUCATION AND AWARENESS

As noted earlier, protection of sacred sites is heavily dependent on the status of social and cultural values and cohesion. It is neither possible nor indeed desirable to turn the clock back and reconstitute local community composition and population patterns as they were many years ago. The approach that has been adopted in various conservation programmes, including the Kayas, is to conduct educational and awareness activities both among the local communities and further afield, using various media. While this will not completely restore cultural traditions associated with the Kayas, it serves to revive interest in the Kayas within various groups of people. It is important to include new values in the information package, such as the importance of the Kayas in terms of their biological diversity, to broaden the stakeholder or constituency base beyond local communities.

LEGAL RECOGNITION

Kenya's official designation of the Kayas as national monuments and forest reserves has provided an element of state protection to bolster the traditional systems whose influence today is variable. A condition for such nomination is that the boundaries of the forests be clearly defined and demarcated. Forest boundaries are determined in consultation with local communities. Conferring official status, however, is not enough on its own, as the relevant acts tend to be weak. This is also true of the enforcement capacity of state organizations, due to lack of resources and poor morale. The continuing involvement of community groups and conservation organizations is essential in monitoring sites and preventing destruction.

INSTITUTIONAL DEVELOPMENT

To conserve the Kayas will require institutional development and capacity building from the national to the local level (Githitho, 1998) including:

- *A legal review to strengthen relevant Kenyan national laws by increasing penalties and making the laws more clearly applicable to sites like the Kaya Forests. This process is being pursued by NMK, who have prepared a bill currently pending enactment into law.*

- *Strengthening links and partnerships among law enforcement agencies to handle cases of forest destruction in Kaya areas.*
- *Strengthening and supporting institutions at the local level — for example, giving the Kaya Elders' committees and conservation groups legal status.*
- *Developing management and coordination bodies at local and regional levels.*
- *Establishing sustainable funding mechanisms to pursue various activities beyond the life of the donor-supported projects that are currently promoting Kaya conservation. There is an urgent need to explore different funding options, including, for example, trusts. The funds available to state organizations in Kenya, such as National Museums of Kenya, are fairly limited.*

PROMOTING BIOLOGICAL, SOCIOLOGICAL, AND CULTURAL RESEARCH

By increasing our knowledge of the Kayas and of coastal forest biodiversity in general, biological, sociological, and cultural research enables us to plan more effectively for their management and conservation. Continued botanical surveys have permitted us to update and improve on the records established by previous studies. Other kingdoms are, however, not as well covered. Research in areas such as rare-species ecology and specific-site ecology is relatively undeveloped and presents interesting opportunities in the Kayas and coastal forests. But there does appear to be adequate data already available with which to develop a general strategy for the conservation of the Kayas, incorporating local community values and priorities — especially regarding the traditional and spiritual dimension of the Kayas. Development of this conservation strategy is a priority output for the CFCU in the coming months.

IMPROVING LIVELIHOODS AND PROVIDING ALTERNATIVES TO EXPLOITATION OF THE KAYA FORESTS

A classic strategy in forest conservation is the promotion of alternatives to potentially damaging utilization of the natural resources of key biodiversity areas. In the case of the Kayas, the CFCU, in conjunction with donors, has supported such an initiative for some years. Local farmers' groups have been provided with potting materials, seeds, and seedlings to assist them in setting up small tree nurseries to raise seedlings to plant on their farms. The species most favoured by farmers are exotic fast-growing trees like *Casuarina equisitifolia,* rather than local species, perceived to be slow growers. Certain tree and shrub species of the Kaya sites, however, are more popular with local people, and proposals are being developed for a domestication project to target the most promising of these. Such a project would establish the ecological, sociological, cultural, and economic feasibility of local farmers growing these forest species on their farms.

Through this forestry programme we have learnt that the semi-arid environment is not always conducive to maintaining nurseries or raising woodlots efficiently and economically. In some areas efforts were made instead to support beekeeping activities, with the aim of producing honey as a source of disposable income. While beekeeping was initially taken up enthusiastically, market issues became prominent, as the sites were in fairly remote areas with poor infrastructure.

Another non-consumptive economic activity that NMK/CFCU is supporting is culturally sensitive tourism at selected Kaya forest sites. An ecotourism pilot project is being undertaken at a

south coast Kaya (Kinondo) in conjunction with local community groups. This will provide some insights into how to proceed with this approach. Local people have accepted a certain level of visits at the Kayas, providing strict controls are in place. But it is unrealistic to expect very high levels of income from visits, even at the best of times. The associated craft trade, in artefacts and curios, is just as important as tourism itself to local groups — if not more so, and especially to women — and should be promoted. There is a continuing need to market the site as an attraction and to work towards its inclusion in local tourist circuits, and promotion and marketing have taken up a large proportion of the project's time. At the same time, care must be taken not to give in to inappropriate demands by tour operators to overlook site regulations, which could compromise the cultural and religious values of the site

What NMK/CFCU's experience is demonstrating about the process of providing alternatives to unsustainable use of the Kaya forests and improving livelihoods is that the success of these activities relies very heavily on management capacity. This has been the case whether the activity is growing seedlings, beekeeping, or community-based tourism. As enterprise skills are usually underdeveloped in these local groups, the need to provide training is immense and the importance of partnership with other institutions and bodies cannot be over-emphasized.

Finally, local economic development is linked very closely to national economic growth, and this has suffered almost continuous decline in Kenya since the early 1990s. The tourism industry, which has been the mainstay of the coastal economy and the primary source of both formal and informal employment, has been particularly hard hit by various factors. Ultimately, the conservation of the Kayas and other important sites is linked to these wider problems and their resolution.

References

Burgess, N. D, G. P. Clarke and W. A. Rogers. 1998. Coastal Forests of Eastern Africa: Status, Endemism Patterns and their Potential Causes. *Biological Journal of the Linnaean Society* 64: 337–367.

Githitho, A. 1998a. *Institutional Challenges in Conservation: The Case of the Scared Kaya Forests of the Kenya Coast*. Kenya, NMK/CFCU.

————. 1998b. *A Report on The International Symposium on 'Natural' Sacred Sites: Cultural Diversity and Biological Diversity*. Kilifi, Kenya: CFCU.

Maunder, M., C. Clubbe, C. Hankamer, and M. Groves, eds. 2002. *Plant Conservation in the Tropics; Perspectives and Practice*. London, Royal Botanical Gardens, Kew: 135–150.

Robertson, S. A. 1986. Preliminary Floristic Survey of the Kaya Forests of Coastal Kenya. Unpublished report to the Director, National Museums of Kenya and WWF International. Nairobi, Kenya: National Museums of Kenya.

Robertson, S. A and W. R. Q. Luke. 1993. *Kenya Coastal Forests: The Report of the NMK/WWF Coast Forest Survey.* WWF Project 3256, Coast Forest Status, Conservation and Management. Kenya: WWF.

Spear, T. 1978. *The Kaya Complex: A History of the Mijikenda Peoples of the Kenya Coast to 1900.* Nairobi, Kenya: Kenya Literature Bureau.

Schaaf, T. 1998. Report on the Workshop on Natural Sacred Sites: Cultural Integrity and Biological Diversity (unpublished report). Workshop held at UNESCO Paris from 22 to 25 September 1998. Paris: UNESCO.

UNEP. 1992. *Convention on Biological Diversity*. UNEP.

UNESCO. 1998. Papers presented at symposium, Natural Sacred Sites: Cultural Diversity and Biological Diversity, Paris, September 1998. Symposium organized by UNESCO, CNRS (*Centre National de la Recherche Scientifique* — National Centre for Scientific Research, France) and MNHN (*Muséum National d'Histoire Naturelle* — National Museum of Natural History, France).

White, F. 1983. *The Vegetation of Africa*. A descriptive memoir to accompany the UNESCO/AETFAT/UNSO *Vegetation Map of Africa*. Natural Resources Research. Paris: UNESCO.

5. Past, Present and Future of Cultural and Sacred Sites in Madagascar

by Hanta Rabetaliana and Peter Schachenmann

1. Introduction

Dr. Hanta Rabetaliana is President of the Madagascan subsidiary of the World Mountain People Association, Tambohitravo Malagasy, Vice President of the World Mountain People Association for sub-Saharan Africa, and a member of the IUCN World Commission for Protected Areas.

Dr. Peter Schachenmann is a technical advisor to the Madagascar Mountain Association and to the World Mountain People Association. He is on the steering committee of the IUCN Commission on Environmental, Economic and Social Policy's Collaborative Management Working Group, in which he is co-responsible for collaborative management in mountain environments

The origins of the Malagasy people and Madagascar's cultural identity are Asian-African. Based on the study of language, village topography, material culture, agricultural techniques, musical instruments, weaving, and metallurgy, the Proto-Malagasy came from the Indonesian Archipelago some two millennia ago. Subsequent immigrations, partly explained by the slave trade, were more from the African continent, including Arabs and Bantu. From the seventeenth century and continuing for several hundred years, Dutch explorers, merchants, and humanists sailed to Madagascar, followed in the nineteenth century by English missionaries. European cultural "footprints" had a profound influence on Malagasy culture, notably with the introduction of Christianity, most successfully in the highland kingdom of the Imerina. Madagascar was later colonised by the French and from the late nineteenth to the mid-twentieth century it evolved into a modern nation state. Although riding the powerful wave of economic globalisation and modernisation in the twenty-first century, in order to provide structure and meaning to societal life of about fourteen million inhabitants, Madagascar's multi-ethnicity and cultural identity is still solidly anchored in traditional beliefs, rituals, and taboos, from birth to death and beyond. The best examples may be seen in two complementary "civilisations": one based on and represented by "rice culture", the other based on the social supremacy and sacred aspect of cattle. Today Madagascar, and notably its highlands, with many sacred mountains, is built on this interconnectedness between a natural, cultural, and spiritual history; hence predestined towards a non-conventional approach to conservation and sustainable development.

2. Sacred Mountains, Nature Conservation, and Sustainable Development

Madagascar highlands comprise many sacred mountains. Among these are the twelve sacred hills of the Imerina kingdom surrounding the capital of Antananarivo, which include the Cultural World Heritage Site of Ambohimanga — the most ancient hillock of Ampandrana, and site of the present day presidential palace in the rural commune of Soalandy-Ankadivoribe. Ambondrombe, a cloud-forest mountain overlooking the eastern escarpment of south-central Madagascar, is a mystic site

where all Malagasy souls are gathered to rest in peace. Further south in the Andringitra massif, the second highest mountain range in Madagascar has several sacred sites. For instance, Amboromena, a legendary site made up of lakes and swamps in a "sea" of huge naked granite domes and boulders similar to Yosemite National Park in California and believed to be the graveyard for all birds; the two sacred waterfalls of Riandahy and Riambavy with their legendary fertility powers for childless couples; the forest of Velontsoa, renowned for its diversity of medicinal plants, source of legendary powers by traditional healers; or the rare dry forests of An'alanja and Tsaranoro, with revered caves, tombs, and refuges of royal Betsileo ancestry dating to the brutal expansion of the Imerina kingdom. All these sites and many more can become the backbone of symbolic significance for non-conventional nature conservation and sustainable development approaches.

Throughout 2002, during the International Year of Mountains, Tambohitravo Malagasy, the Madagascan subsidiary of the World Mountain People Association (WMPA) and the *Association des Montagnes Malgaches et Africaines* (AMMA, Association of the Malgasy and African Mountains) promoted a lively debate and mutual learning experience for culture-based sustainable development and ecosystem conservation. In an attempt to understand the seemingly opposing paradigms of modern and traditional beliefs, uplands and lowlands, market-based and barter economies, participants, among them representatives from civil society, policy makers, and NGOs and scientists and experts from sub-Sahara Africa and Madagascar, examined the different perspectives under the theme "African Mountains, Memory and Landscape: How Best to Build Bridges between Conservation and Development Objectives" The outcome is the Madagascar National Mountain Strategy, providing *inter alia* a functional framework model for testing culture-based environmental conservation for sustainable development.

Andringitra massif, a distinct bio-geographical barrier and bridge to life forms and cultures.

© Peter Schachenmann

Mountains can be seen as biophysical barriers, due to their poor accessibility and harsh environmental features, rugged terrain, high peaks, and forbidding cliffs. In fact, they separate weather regimes and vegetation zones (both horizontally and vertically), divide water catchments and water reservoirs, and provide habitats and refuge to biological, cultural, linguistic, and agricultural diversity, which are often endemic. Their remoteness offers refuge to diverse life forms and strong traditional beliefs and customs that are roots for indigenous nature conservation.

Mountains and Sacred Sites

Madagascar's central mountains and highlands, such as the twelve sacred hills around the capital city, Tananarive — an area that includes the World Heritage Site of Ambihimanga and the region of Ankaratra — have exclusive cultural significance.

In the northern and southern mountains and highlands of Tsaratanana (in the north) and the Andringitra (in the south), sacred sites have in addition significant biodiversity and conservation value. They include cloud forests and forest corridors serving as genetic bridges between protected areas (e.g. Ambondrombe), and sites that offer rare punoid or paramoid sub-alpine prairies, with a very high degree of plant and animal endemism.

While mountain sacred sites draw their relevance from a traditional world view of the past, they are being rediscovered today by tourists, scientists, and economists alike for their natural beauty, lifting the mind and tired spirit of millions of visitors of diverse cultural backgrounds; for their biodiversity richness, serving as gene pools to assist degraded landscape rehabilitation; and for their ecosystem services, such as clean water, energy for industry, agricultural production, and the essential needs of people in the lowlands. Climbing a summit is often said to reaffirm strength and triumph, or to simply offer a feeling of being "on top of the world", or at least "on top of oneself". Mountains are places to reflect on mortality and immortality, the immaterial and the mysterious essence of spirits. Paradoxically, more and more popular initiatives for ecotourism ventures in Voluntary Protected Areas, traditionally sacred mountain sites in Madagascar, are becoming important spiritual bridges for diverse cultural, social, and economic values.

2.1 Sustainable Mountain Development in Sub-Saharan Africa and Madagascar

Two issues are of particular concern to the Africa Region. These are:

- *Mountain environments in Africa are facing serious degradation, directly limiting the livelihood of mountain people and sustainable natural-resource use*
- *Mountain people are not being heard; their concerns, rights and potential to conserve and sustainably develop mountain environments are not being adequately considered.*

In Madagascar, the process of developing a national mountain strategy is spearheaded by two mountain associations: the Madagascar Mountain and Highland Association (AMMA) and the World Mountain People Association (WMPA) (or *Tambohitravo Malagasy* (TM)). The work of these two associations is two-pronged and complementary: AMMA is attached to the University of Antananarivo and has a more top-down vision and approach, while TM is anchored in civil society with a more bottom-up vision and an approach focussing on the community level.

The mission shared by these two associations is therefore focused on these two concerns:

- *Ensure that the interests and potentials of mountain people are placed at centre-stage in mountain area development in Africa, and*
- *Ensure that mountain peoples in Africa are able to act progressively on their own behalf toward betterment of their livelihoods and the protection of their rights and local environment.*

Tambohitravo Malagasy

"When mountain people are able to lead the awareness creation process at all scales, then leaders may follow with more equitable resource allocation for action"
David Suzuki

© Pierrot Men

Guided by David Suzuki's motto, the actions taken by Tambohitravo Malagasy, the World Mountain People Association's Branch in Madagascar, focus on: a) facilitating a process for the empowerment of mountain peoples, and b) encouraging collaborative and transdisciplinarity approaches to research and development.

EMPOWERMENT

The aim of empowerment is to promote a fundamental shift in the position of mountain peoples; from being *beneficiaries* to becoming *actors* of their own situations. Aware that many development programmes involve local communities as *stakeholders*, association members seek to go a step further and promote the right of mountain people to become *shareholders*. This implies that they should gain a controlling share over decision-making affecting their lives and the resources upon which they base their livelihood and society. Specifically, the strategy aims at actively promoting and supporting programmes that help mountain peoples *secure customary or informal rights* to mountain resources including land, water, forests, and wildlife. This is the crossroads where sacred sites and cultural integrity play a central role in conservation and sustainable mountain development.

COLLABORATIVE AND TRANSDISCIPLINARITY APPROACHES

Mountain peoples depend directly on collaborative and trans-disciplinary research and development related to issues of culture, biodiversity, and environment. Usually such research is carried out in isolation from local populations. The TM strategy aims at encouraging researchers to devise and implement research investigations hand-in-hand with local populations and their needs, which will afford them substantial local knowledge. It will also provide an in-built opportunity for the dissemination of findings at the local level and for local-level action, based upon research findings, to be organised and implemented. This builds upon the principle that many of the environmental crises facing mountains can be addressed, and should be addressed, at the local level, by the local level, with experts providing only technical support and guidance.

3. Community Mountain-Resource Development: Two Case Studies

3.1 The Voluntary Protected Area of An'alanja, the Forest of Anja

This historic site is made up of three magnificent granite rock domes, each four to five hundred metres tall; *Amboalady* in the north, *Andrarambola* and *Irambo* in the south. It shelters some twenty hectares of natural deciduous forest among an impressive rock fall on its northern flank, giving way to a labyrinth of canyons and caves. At the base of a cliff is a spring whose waters, mostly underground buried by rock fall, feed a small lake at the foot of the granite domes, a preferred site for aquatic birds during the winter months.

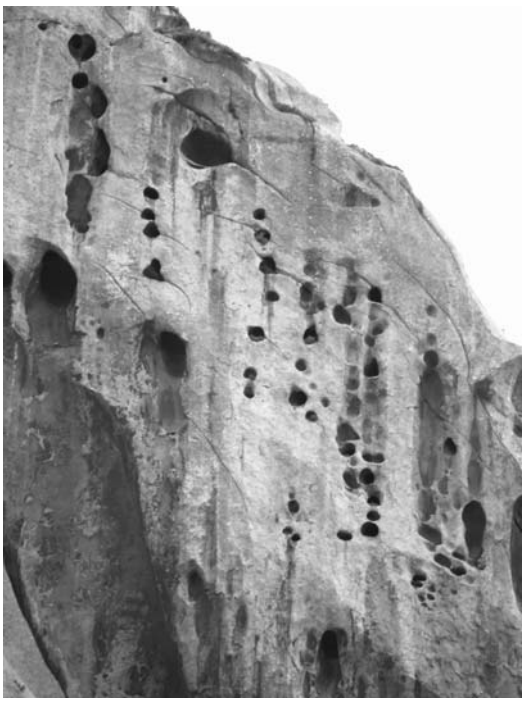
An'Alanja, Community Protected Area
© Peter Schachenmann

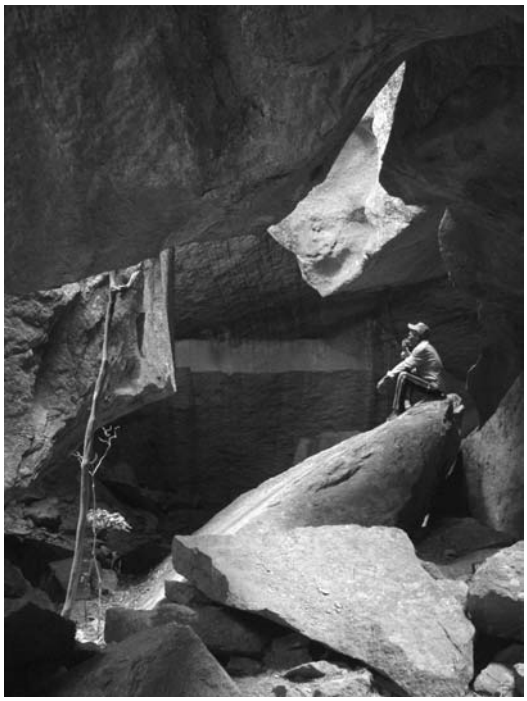
This small forest amidst the granite boulders harbours a treasure of biodiversity and cultural artefacts. The most admired by visitors today are a species of rock-climbing ringtail lemurs (*Lemur catta*); the great variety of terrestrial and epiphytic orchids; endemic xerophytic plants, such as *Pachypodium denislorum,* many of which possess medicinal properties; and the caves and tombs under the rock boulders and cliff faces.

According to legend, the caves were first occupied by noble families and later, during the expansion of the Imerina kingdom, served as refuges from persecution. The granite domes have more or less vertical cliffs interspersed with many "tafonies" — natural holes and caves formed over millennia by wind and chemical erosion in acid granite. These tafonies served as traditional burial sites for nobles of royal ancestry up until about 1930. The deceased, wrapped in exquisitely decorated natural silk "lambas", were carried in grand ceremonies called *vahi-masoandro* to the top of the domes and then lowered over the vertical cliff into the tafonies by ropes made of tough grass called "tenina" (*Imperata cylindrica*). During the colonial era, descendants of the early cave occupants re-organised themselves in the nearby village of Anja.

Assisted by Tambohitravo Malagasy, the community of Anja today leads a non-conventional model for culture- and nature-based integrated conservation and ecotourism development.

An'Alanja is only fifteen kilometres south of the town of Ambalavao, close to the national trunk road. Although tourists had previously visited the site during colonial times, the community was until recently in disagreement on its future use. Three groups were each fighting for supremacy; the





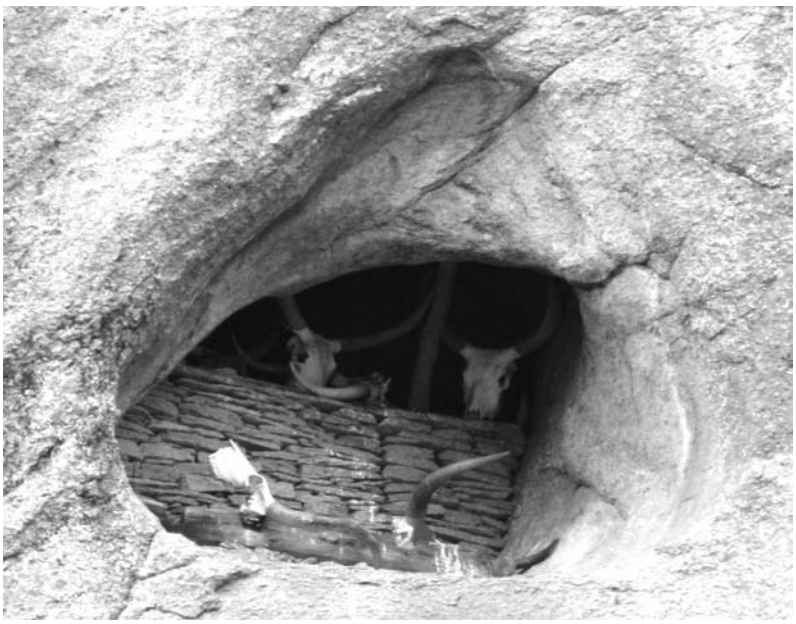
Left: *An'Alanja, cave circuit.*
© Peter Schachenmann

Right: *An'Alanja, granite domes with tafonies, natural erosion forms, serving as tombs for nobels*
© Peter Schachenmann

first was made up of fifteen households, who saw the fertile forest soil and water-retention capacity within the rocks as a resource to "develop" into diversified agriculture (bananas, corn, tomatoes, onions, beans, chilli pepper etc.); the second group, led by educated absentee landlords, wanted to develop the site for tourism and personal profit.

During the 1990's the dispute between these different visions continued for several years and, true to the local proverb *"when bulls fight, the grass gets trampled",* the cultural and biodiversity values of the site rapidly decreased. Finally, community solidarity eventually won, with a young generation of villagers emerging as the third stakeholder group. They were interested in upholding the traditional respect of their noble ancestors while preserving the cultural and natural values of the site for posterity. At the initiative of the local people, *Tambohitravo Malagasy* and the World Mountain People Association helped develop strategies for a Voluntary or Community Protected Area, managed by the community themselves. They also encouraged cultural and ecotourism as part of the vision for the site. Villagers worked hand in hand with TM practitioners and scientists, fostering awareness of the site's non-material (historical and cultural) values and biodiversity values, eventually eliminating destructive shifting cultivation and demonstrating upstream-downstream linkages for sustainable agriculture.

Modern tourist visits began in 1997, and in 1999 An'Alanja became a shining example of a successful self-help initiative led by young villagers, with an increasingly popular eco-tourism venture, known today as Anja Miray (Friends of Anja), with eighty members that manage the site and activities. In 2001, the association was



A tomb. within a tafoni, in An'Alanja,
© Peter Schachenmann

legally as well as traditionally recognized according to Madagascar's *Gestion locale sécurisée* (Secure Local Management) law (law N° 96-025), which describes mechanisms and tools for the transfer of identified natural resources and their management from the state to local communities.

Today, village youth groups have developed a cultural and historic site that comprises twenty hectares of forest and several cave circuits for cultural ecotourism visits. Several local guides have been selected and trained. During 2001 more than 2000 tourists visited An'Alanja, and the site is gaining popularity. The association now counts one hundred and twenty members, including twenty women, who earn up to US$10.000 per year. Compared to the nearby Andringitra National Park, An'Alanja has more visitors at less cost, and as such is more financially sustainable than the national park, which survives on donor and state subsidies. Anja Miray draws its strength from its endogenous cultural roots and dynamics.

3.2 Amondrombe Sacred Mountain

This case-study demonstrates how respect toward ancestors and recognised elders of society and traditional wisdom may initiate and lead to a local development process.Situated in a natural forest corridor halfway between the Andringitra and Ranomafana National Parks on Madagascar's eastern escarpment, Ambondrombe is a sacred mountain for local people and a biodiversity hotspot for scientists. Fifteen thousand hectares of humid tropical forest shrouded in rare cloud forest cover its flanks between five hundred metres and the peak, 1,936 metres above sea level. Several springs are found on the mountain.

Two centuries ago, a clan of noble families occupied the site, eventually becoming a stronghold for the Hova. Many Malagasy people today believe that this mountain is the prime refuge site for their souls after death. Largely as a result of its sacredness, we hypothesise that to date the forest remains undisturbed.

Until a decade ago, the sacred site of Ambondrombe was situated fifty kilometres from a national highway in the south of Madagascar. The larger highland region, with a mosaic of natural and cultural landscapes, reminds the visitor of Gondwana and its geo-morphological history five million years ago. It offers a window into the cultural memory of the royal Betsileo and Merina civilisations, and is still largely in harmony with nature, with abundant natural resources.

However, a rural road rehabilitation project undertaken two years ago has opened the door to multiple new interests. There is immigration from other ethnic groups and growing interest from outside stakeholders. These people come in the search of new land, commercial wood, trade and mining opportunities, and as tourists. New stakeholders increase the area's political complexity and enhances the risk of corrupt practices arising, increasing pressures on traditional cultural values and sustainable natural-resource uses. The challenges multiply, thus accelerating change. For instance:

- *Elders and younger generations, poor and rich, and men and women do not always share the same vision of the future.*
- *Outsider commercial influences, perspectives, and interests begin to clash with ancestral beliefs, local traditions, and knowledge.*
- *New economic development plans for the region clash with local subsistence needs.*
- *Flexible local governance systems and traditional law enforcement are confronted with modern laws, decrees, and rules and the inflexibilities of a modern nation state.*
- *Land becomes scarce as population pressure from natural growth and immigration increases.*

How can the complex interests and conflicts at play be effectively managed to conserve this unique natural and cultural jewel in Madagascar?

Exceptional self-help initiatives by local leaders are showing the way! Such initiatives have managed to mobilise a significant portion of local communities to organise themselves in village committees, each responsible for a delineated piece of territory related to traditional boundaries and according to customary law, negotiated with multiple stakeholders. Illegal settlers and even "legal" (state-approved) logging are no longer permitted, and new rules have been drawn up. In a process lasting several years, and with resistance from some vested interests, the community near Ambondrombe has managed to draw up a natural-resource inventory, demarcation, and management plan with significant support from various organisations such as Tambohitravo Malagasy, the Rainforest Foundation, local NGO's and environmental mediators, and the governmental Water and Forestry Service. This plan will eventually form the basis of a contractual agreement between the state and the community. Learning from the successful An'Alanja ecotourism enterprise, cultural tourism initiatives have been initiated to diversify from subsistence agriculture.

In this fortunate case, lead by respected elders of royal ancestry, trust for a common vision into the future won over vested short-term interests. The local community, from being traditional caretakers of cultural values (the sacred site) have evolved to become acknowledged forest custodians, protecting valuable natural resources against migrants, settlers, and illegal logging.

4. Lessons Learned

Cultural evolution in Madagascar has in history been brought about by the arrival of various colonisers and/or shaped by new environmental challenges, building on two millennia of adapting to

each new context encountered. In turn, human existence and activity have contributed in shaping the surrounding wilderness, eventually becoming the birthplace of two complementary "civilisations": one based on rice and the other on cattle.

Today it is difficult to imagine a natural system that has not been impacted and modified by human culture, whether directly or indirectly, for better or for worse. We are increasingly aware that the entire history of settled (as opposed to nomadic) society is in perpetual "partnership" between nature and culture. Even wilderness landscapes, like, for instance, the Andringitra Mountains or the humid tropical forests of the eastern escarpment, which we perceive to be "pristine", turn out at closer inspection to be a product of nature-culture interaction. (Schachenmann 1999; Rabetaliana and Schachenmann 1999). This *co-evolution* of nature and culture can be seen as a living system or "*livescape*" that can be considered to have a history, a current situation, and a future that lend themselves to the appreciation and analysis of current strengths and weaknesses, opportunities and threats of natural and cultural evolution in mountains from a perspective of *flowing time and processes with circular causality.* That is, causes and effects are not linked in linear relationships but are the results of interrelationships between multiple (natural and human) actors.

Powerful traditional and modern forces compete for supremacy. There is a lot of potential for conflict to lead to a dilution of cultural values and ecological degradation. In this process it is preferable that motivation and initiatives, to adapt to changing circumstances, come from local actors — most notably among recognised traditional leaders of local communities, be they elders or youngsters, men or women. However, in all cases, negotiation, mediation and arbitration need to be engaged to facilitate a common vision and achieve forward-thinking goals. The approach must be equitable, fair, and collaborative, with equal weight and respect given to legitimate stakeholders for synergy and collective decision-making.

We strongly believe that as long as Madagascar's multi-ethnicity and cultural identity remains anchored in traditional beliefs, rituals, and taboos — from birth to death and beyond — a non-conventional approach to biodiversity conservation and sustainable development has a good chance of success. A strong cultural identity and shared values such as the importance of sacred sites are seen as powerful denominators in a process of co-evolution between multiple opposing forces and ideas at all scales.

The An'Alanja and Ambondrombe case studies clearly show that self-help initiatives based on traditional cultural values and sacred sites, as well as trust, vision, and solidarity, combined with negotiation and mediation assistance (by Tambohitravo Malagasy/WMPA and others), can become powerful drivers for natural-resource protection, economic diversification, and sustainable mountain development. Common to both case studies is the success of mixing traditional organisational rules and local capacities of management with modern laws and administrative procedures. Local leaders themselves became aware of the fast transformation of the socio-cultural context and modern socio-economic challenges threatening the harmonious coalition and co-evolution between nature and culture. The Ambondrombe sacred site has succeeded because respected elders led the process, and An'Alanja became a famous site thanks to a group of young and enterprising community, including women, who led the bottom-up initiative.

The crucial role of the facilitator (Tambohitravo Malagasy/WMPA) has been, in both cases, to foster community capacity for negotiation with modern state institutions and global stakeholders and players and the creation and facility of a suitable environment for collective decision-making between old and new world visions and values. This allows negotiated institutional agreements and actions to be followed by all. It can also be interpreted as a shining example of what can be achieved for sustainable mountain development in Madagascar through the World Mountain People Association's visions: "When people lead, leaders will follow!" and "Stakeholders become Shareholders".

Perspectives

The process described in this paper is a first step towards signposting the way to more elaborate conservation and sustainable mountain-development initiatives. Tambohitravo Malagasy/WMPA are currently investigating, developing, and testing instruments, tools, and methodology for appropriate and affordable compensation mechanisms for:

- *ecosystem services provided by upstream resource users/managers to far away downstream and urban stakeholders;*
- *cultural traditions, beliefs and local knowledge systems offered to outside visitors such as scientists and tourists;*
- *the building of inter-communal interest groups, united in one voice for better lobbying, marketing and negotiating with outside stakeholders and new actors. The test sites are proposed are the Ambondrombe sacred mountain, including the extended Mananatana watershed area, and the villages around the An'Alanja in the region of Fianarantsoa.*

References

Commune of Iarintsena (Ambalavao District, Madagascar). 2001; *L'histoire d'Alan 'Anja*. Report prepared for the World Mountain People Association.

Rabetaliana, H., M. Randriambololona, and P. Schachenmann. 1999. The Andringitra National Park in Madagascar: The Use of Traditional Knowledge and Modern Methods for the Management of Mountain Natural Resources. In *Unasylva* 196, vol. 50.

Rabetaliana H., and P. Schachenmann. 2000. Community-Based Management of Natural and Cultural Resources at Ambondrombe. *IUCN Collaborative Management Working Group Newsletter* N° 4.

————. 2002a. Towards a Voluntary Protected Area in Madagascar. Paper presented at the 6th International Conference of the African Mountain Association (AMA).

————. 2002b. *An'Alanja, une aire protégée volontaire*. Information pamphlet.

Schachenmann, P. 1999. Synthèse préliminaire des écosystèmes montagnards du complexe de la Réserve Naturelle Intégrale d'Andringitra et de la Réserve Spéciale du Pic d'Ivohibe, Madgascar. In *African Mountain Development in a Changing World*, edited by H. Hurni and J. Ramamonjisoa. Antananarivo and Berne: African Mountains Association (AMA) and Geographica Bernensia.

————. 2002a. How to Fully Assume People's Rights and Responsibilities? What Type of Cooperation Should be Built between Mountain Communities and Territories? Paper presented at the 2nd Encounter of the World Mountain People Association, Quito, Ecuador.

————. 2002b. How Can International and Regional Agencies and the Programmes They Implement Support Equitable and Sustainable Mountain Development Adapted to Territorial and Human Specificities of Mountains? Paper presented at the 2nd Encounter of the World Mountain People Association, Quito, Ecuador.

Schachenmann P., Rabetaliana H. 2001. "JORO", a Cultural Experience in Madagascar. *Information Bulletin* N° 1, town council of the commune of Ambohimahamasina (Fianarantsoa district, Madagascar).

Schachenmann, P. and Rabetaliana Schachenmann, H. 2002. Mountain Populations: Their Visions for the Future. *Policy Matters* (IUCN-CEESP, Commission on Environmental, Economic and Social Policy), Section 4: 128–131.

UNEP. 1999. *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to Global Biodiversity Assessment.* London: Intermediate Technology Publications.

Swiss Agency for Development and Cooperation. 2002. *Proceedings of the International Symposium "Mountains of the World: Community Development between Subsidy, Subsidiarity, and Sustainability", Interlaken, Switzerland, 2001.* Swiss Agency for Development and Cooperation (CD-ROM).

6. WWF: Safeguarding Huichol and Seri Natural and Cultural Heritage in Mexico

by Mercedes Otegui Acha

Background

Mercedes Otegui Acha represents the Mexico Program Office of the World Wide Fund for Nature (WWF) in Mexico City

Since it was founded in 1961, the World Wide Fund for Nature (WWF) has become one of the world's largest organizations dedicated to the conservation of nature. WWF now operates in around one hundred countries, supported by nearly five million people worldwide.

WWF's mission is to halt the degradation of the planet's natural environment and to construct a future where humans live in harmony with nature, by:

- *Conserving the world's biological diversity*
- *Ensuring that the use of renewable natural resources is sustainable*
- *Promoting the reduction of pollution and wasteful consumption.*

In 1990, WWF opened a regional field office in Oaxaca, southern Mexico, and in 1993 initiated a country Program Office, located in Mexico City, responsible for developing a comprehensive country program for Mexico. WWF's role in Mexico has evolved over the years from awarding small grants to training conservation leaders; from forming new NGOs and researching the status of selected species to concentrating on technical and financial resources in a few large regional ecosystem areas and, more recently, in entire ecoregions of Mexico.

WWF's Mexico Program works in three ecoregions: the Gulf of California, the Chihuahuan Desert, and the Mesoamerican Reef ecoregions, and one thematic program, the Mexican Forests Program. WWF has initiated two innovative conservation experiments within two indigenous communities: the Seri community in the Gulf of California Ecoregion and the Huichol community in the Chihuahuan Desert Ecoregion. The objective is to protect both the natural and cultural heritage of these communities.

Wirikuta: the Huichol's Sacred Space in the Chihuahuan Desert

Wirikuta is located in the Chihuahuan Desert of the State of San Luis Potosi in Mexico. The Chihuahuan Desert is one of the most biologically rich and diverse deserts in the world, rivalled only by the Namib-Karoo of southern Africa and the Great Sandy Desert of Australia. It covers nearly 630,000 square kilometres (250,000 square miles), stretching from the Mexican plateau into

southeast Arizona across New Mexico and West Texas, and is bounded by the Rocky Mountains and the Sierra Madre systems.

The Huichols belong to the Uto-Aztecan-Sonoran tribes that inhabit the western Sierra Madre. They have resisted several invasion attempts, from the early Spaniards up until the early 1900s and the religious fanatics known as the "cristeros". The Huichol's main settlements are located in the state of Jalisco, though there are also important Huichol settlements in the states of Nayarit and Durango.

Several protected areas in Mexico include sacred sites within their boundaries, a fact that is not surprising in a country with more than fifty-six indigenous peoples, and which houses spectacular biological diversity. Despite this, none of these reserves had, upon their creation, the explicit mandate of protecting the area's natural and cultural components, but were rather created under a biodiversity-conservation-biased premise. Reserves that include sacred sites tend to be conceptualized in their management plans as sites containing an additional "dimension", rather than integrating this element as the main axis through which the management objectives are achieved. It is this crucial difference that makes Wirikuta altogether unique — since from its very inception as a protected area it has been explicitly designed to protect the area's cultural heritage first, followed by its natural heritage.

Wirikuta encompasses the eastern end of the Huichol "geography" and was the final destination of the Huichol ancestors during their pilgrimage to witness the birth of the sun. Wirikuta is also where the first deer hunt took place: it was from the deer's foot prints that the peyote, the sacred cactus, was born.

In 1994 Wirikuta was decreed a "Site of Cultural and Historic Heritage and an Area under Ecological Conservation of the Ethnic Group Wirrarika" (for short, an Ecological and Cultural Reserve), encompassing the Wirrarika's sacred sites as well as their historical-cultural route located in the municipalities of Villa de Ramos, Charcas and Catorce It is important to mention that the reserve's first boundaries were hastily agreed upon so as to avoid the construction of a road that was to traverse the very heart of the Huichol sacred site. The reserve was created and then succeeded in safeguarding the integrity of the Huichol sacred space. However, a number of key adjacent areas, home of diverse and endemic flora, were not included due to the hastiness that prompted this very first decree.

It was not until October 2000, when WWF involvement began, that a new decree, under the same category, expanded the original 73,000 hectares to its current 140,211 hectares, in an effort to include those biodiversity components excluded in the first decree. In addition, 138.8 kilometres of the Huichol pilgrimage route was to be protected under this new decree. In June 2001, the reserve was finally decreed a Sacred Natural Site, keeping the same boundaries.

The environmental law of the state of San Luis Potosí is one of the most advanced and sophisticated in Mexico. As stated earlier, this environmental law has the uniqueness of taking into account the protection of natural sites sacred to the indigenous peoples that, like the Huichols, traverse or inhabit the state. Up until June 2000, this quality was designated under the "Ecological and Cultural

Reserve" category. Since then, the Sacred Natural Site designation has encompassed the cultural and natural duality of a number of protected sacred indigenous sites in the state. The definition of this category reads as follows:

> "*Sacred Natural Sites are those natural areas which, in addition to their biodiversity importance, are sacred spaces for indigenous peoples, and where ceremonies with a divine character are performed. In these sites reality is seen and perceived under a magic, spiritual and natural perspective, and ritual offerings and ceremonies of the very same indigenous peoples do take place.*" (San Luis Potosi Official Journal, June 2001).

WWF's financial support to develop the reserve's management plan was crucial to prevent Wirikuta's becoming a "paper park". A draft version of the plan is being circulated to the area's key stakeholders; workshops are being organized by the San Luis State Government Environmental Agency to allow the Huichols, the cultural users of the area, and the local landowners, the natural-resource users, to revise, modify, and eventually approve and implement the management plan. The Potosino plateau, one of the most condemned areas in Mexico due to poverty and massive emigration to other national cities and abroad, has a management plan mandate that is twofold: on the one hand its mandate is to safeguard the Huichol cultural heritage, while on the other hand, it counterbalances local community pressure on the area's natural and cultural resources by promoting the sustainable use of natural resources while enforcing respect for Huichol sacred sites.

Tiburon Island-Taheoc: The Seris' Sacred Space on the Gulf of California

Tiburon Island is located in Northwest Mexico, on the Gulf of California, which extends from the Colorado Delta River to Cabo San Lucas on the Baja California peninsula's southernmost tip and to Cabo Corrientes in the state of Jalisco. It is made up of more than nine hundred beautiful islands and islets. Isolated portions of the Sonoran Desert are considered living evolution laboratories. Except for Isla Tiburon and the temporary dwelling of Seri Indians over many centuries, all these islands are uninhabited.

The Gulf of California accounts for a mere 0.008 percent of the world's oceans, but it has an outstanding diversity of marine mammal species: thirty-four species, including the sea lion — the only pinniped found in the Gulf — and the sea otter (the other thirty-two species account for one third of the world's cetaceans). It also provides refuge for one of the world's most endangered cetaceans, the Vaquita porpoise, which is endemic to the Upper Gulf of California. Conversely, in its subtropical and rich waters thrive two of the world's largest whale species, the blue whale and the fin whale. In addition, some of the Gulf islands serve as important nesting sites for migratory and resident bird species and are breeding grounds for sea lion colonies.

In addition to its marine and coastal biodiversity, on the dusty desert hills that surround the Gulf stand the world's two largest cacti species: the Sahuaro and Cardon cacti, which tower over the desert and can reach heights of up to fifteen metres.

The total Seri population currently numbers fewer than nine hundred individuals. This group was at the brink of extinction in the 1920s — today they own a territory totalling 210,000 hectares in the state of Sonora, encompassing Tiburon Island (120,000 hectares) and 90,000 hectares of mainland territory. This nomadic tribe considers Tiburon Island to be the centre of its cosmovision and universe.

In the mid 1990s, Tiburon Island, together with other islands in the Gulf area, fell under federal protection as part of The Great Islands Biosphere Reserve. The reserve managers have tried ever since to develop a subcomponent of the reserve's overall management plan to specifically deal with the island's unique natural and cultural attributes.

The Seri felt that their cultural traits were being neglected in the overall conception of this subcomponent, and they approached WWF to develop a land-use plan for their territory that would be based not only on natural but also cultural criteria. This project began only in September 2002.

Working with the Council of Elders, WWF has been locating and mapping sites of cultural significance to the Seri both on the island and on the mainland. Each site is positioned on a digital map and an elder shares the mythological stories associated with them, stories that for the most part have a direct impact on the management of the site's natural resources. The valuable results of this study will be incorporated into the Tiburon Island management plans as well as the reserve's overall plans.

Finally, the wealth of traditional ecological knowledge (TEK) being generated by this project will be kept by the Council of Elders, to be included in the educational curricula of their traditional school.

World Parks Congress

The WWF is planning on taking both the Huichol and Seri experiences to the forthcoming World Parks Congress as case studies to emphasize the importance of Sacred Natural Sites in the protection of natural resources. Representatives from the Huichol and Seri Councils of Elders will be attending and sharing their special vision of the protection of natural resources, one in which nature and culture go hand in hand and are an indivisible entity.

7. The Rigoberta Menchu Tum Foundation's Sacred Natural Sites Program

by Alfonso Alem Rojo

1. The Rigoberta Menchu Tum Foundation

Alfonso Alem Rojo is the Executive Director of the Rigoberta Menchu Tum Foundation, Mexico, and a member of the IUCN's Task Force on Non-Material Values of Protected Areas

The Rigoberta Menchu Tum Foundation (RMTF) was founded following the awarding of the 1992 Nobel Peace Prize to Mrs. Menchu. As an active supporter of intercultural dialogue and peace, it constitutes her institutional platform for implementing strategies safeguarding human and indigenous peoples' rights.

Since 1993, the foundation has strengthened relations with social movements, indigenous organizations, relevant NGOs, intergovernmental and governmental agencies, and academia.

The foundation has a national and international agenda, directed and executed from its main headquarters in Guatemala and Mexico.

1.1 Our Mission

Mrs. Rigoberta Menchu Tum, as Nobel Peace Prize Laureate, indigenous woman, and survivor of recent Guatemalan genocide, together with her foundation, actively promotes the observance of a "code of ethics for a millennium of peace":

CODE OF ETHICS
FOR A MILLENNIUM OF PEACE

There is no peace without justice;
No justice without equality;
No equality without development;
No development without democracy;
No democracy without respect to the identity and dignity
of cultures and peoples

The RMTF is actively struggling against racism, discrimination, and exclusion. It seeks a more visible role for indigenous peoples, in order to achieve full recognition of their rights and their valuable contributions of knowledge and experiences, and to attain indigenous participation in institutions on different international forums.

This agenda has resulted in exciting experiences and stimulating partnerships such as:

- *Indigenous Dialogues Program*
- *Indigenous Children Regional Program*
- *Indigenous Culture and Intercultural Dialogue*
- *Sacred Natural Sites Program*

2. Indigenous Peoples and Cultural Diversity

Around 6,800 languages are spoken in the world today, representing different forms of expression, different ways of understanding the world and life — and an estimated indigenous population of about five hundred million people worldwide. The Americas alone account for more than fifty million people, belonging to more than five hundred different peoples and speaking nearly a thousand different languages and dialects.

The map of this cultural diversity overlaps surprisingly with the best examples of preserved biological diversity. There is no doubt that where man and nature have survived, the traditional knowledge of an indigenous people has been responsible.

Despite the devastation caused by colonial exploitation of indigenous territories, and the expansion of agricultural frontiers that resulted from the impoverishment suffered under centuries of displacements and discriminatory policies, indigenous territories still constitute the best-preserved natural areas in many parts of the world today. The greatest threats to their integrity are major infrastructure projects. These sites have, for the most part, survived due to their sacred character, the humble lifestyles of indigenous peoples, and the sustainable use and management of their resources. Their conservation is a result of ethnic values evoking the spiritual relationship between indigenous peoples and nature.

Nevertheless, to date, a lack of recognition of this reality has prevailed, not only in official policies but also in the conservation community. So, we can observe that:

- *Many protected areas created to date overlap with indigenous peoples' land and resources. The value and importance of sacred places and traditional practices have often been ignored and have thus affected the fundamental rights of those peoples. This fact has led to situations of conflict and distrust, which have created obstacles for the development of co-operation and constructive relationship building between those peoples and conservation decision-makers.*
- *Nevertheless, in the last few years, international intergovernmental and non-governmental organisations such as UNESCO, the World Commission on Protected Areas (WCPA), the World Conservation Union (IUCN), and the World Wide Fund for Nature (WWF), have developed new policies and approaches on this issue, although most of them lack validation in the field and effective institutional support and prioritisation.*
- *On the other hand, indigenous organizations have not yet developed a strategy in this regard. So, there is a need for common understanding and joint action on both sides.*

3. Partnerships

To overcome this situation by actively participating in the development of co-operative and constructive relationships between indigenous peoples and conservation decision-makers, RMTF has established and promoted relationships with several indigenous leaders, organizations and networks, such as:

- *Indigenous Initiative for Peace*
- *Indigenous Environmental Network*
- *International Indian Treaty Council*
- *International Forum of Indigenous Women*
- *Continental Network of Indigenous Women of the Americas*
- *and more than two hundred indigenous organizations*

Consequently, the Indigenous Initiative for Peace (IIP) endorsed the proposal made by RMTF during the IIP 2001 General Assembly, held in Ouje-Bougoumou (in Cree Territory, Northern Quebec, Canada), and more recently, at the First Indigenous Women Summit of the Americas held in December 2002 in Oaxaca, Mexico. The IIP has incorporated into its Plan of Action a specific mandate calling upon indigenous organizations to share their experiences and to discuss the possibility of presenting several case studies during the Vth World Parks Congress, to be held in Durban, in the Republic of South Africa, inSeptember, 2003 — thus establishing a continental network coordinated by the RMTF.

The RMTF has also been constructing a more comprehensive relationship with other actors and organizations, such as:

AT THE INTERNATIONAL LEVEL

- *UNESCO, the United Nations Environment Programme (UNEP), the Food and Agriculture Organization (FAO), and the United Nations Development Programme (UNDP).*
- *IUCN, WCPA, the Task Force on Non Material Values of the Protected Areas, WWF, and The Nature Conservancy (TNC).*

AT THE REGIONAL LEVEL

- *The Central American Commission on Environment and Development.*
- *The Meso-American Biological Corridor.*
- *IUCN, Regional Office for Meso America*

AT THE NATIONAL LEVEL (MEXICO)

- *The Ministry for Environment and Natural Resources (SEMARNAT), the Center for Environmental Education (CECADESU), the National Indigenous Institute (INI), and the Office of the Presidency for Indigenous Peoples (ORPI).*
- *The Mexican Working Group on Sacred Natural Sites*
- *The Indigenous National Environmental Network*
- *The NGO national network on peoples and conservation*

4. RMTF's Program on Sacred Natural Sites

For indigenous peoples, the whole earth (*mother earth*) is sacred, and particularly those places that play a special role in their cosmovision. The RMTF's program on Sacred Natural Sites is exploring and focusing its efforts on specific areas — areas in which: a living culture is occupying their ancestral territories; significant natural wealth coincides with sacred places; an identifiable danger threatens natural and/or cultural resources; a participatory approach is possible, particularly that of the local and indigenous communities; partnerships with other public and private actors may help to avoid or resolve conflicts; and where educative and demonstrative effects are likely, not just for the region and neighbouring communities but in terms of broader public understanding and official policy. Examples of areas that correspond to these criteria in the Americas include:

MOUNTAINS

- *Andean glaciers (Bolivia)*

LAKES

- *Patzcuaro (Mexico)*
- *Titikaka (Peru-Bolivia)*

FORESTS

- *Chimel (Guatemala)*
- *Ouje-Bougoumou (Canada)*

The RMTF is also considering a Regional Project to identify and protect threatened Sacred Natural Sites in Central America within the Mesoamerican Biological Corridor.

5. Objectives

The main goal of this initiative is to obtain legal, political, financial, and technical support, at global, national and regional levels, for the long-term protection and effective management of indigenous peoples' sacred sites and the protection of other traditional practices relevant to biodiversity conservation, while at the same time strengthening traditional cultures and institutions and promoting recognition of the rights and interests of such peoples, in accordance with the provisions of Agenda 21, the Convention on Biological Diversity, and other international instruments.

Towards achieving this, we resolve:

- *to mobilize global public opinion and respect towards the protection and survival of indigenous peoples' sacred sites;*
- *to persuade the international community and national governments of the need for laws and policies to ensure the protection and management of sacred sites, including the reform of protected areas legislation and policies whenever necessary;*
- *to develop technical, legal, and political tools in support of global, national, and regional actions for the protection and management of sacred sites, with attention given to issues such as management and planning*

processes and methods based on absolute respect for the cultures, values, knowledge, practices, and decisions of indigenous peoples;

- *to promote and facilitate the direct involvement of indigenous peoples and communities in the discussion, development, and implementation of measures necessary to achieving this end, so as to ensure their prominent role in the strategy;*
- *to promote the development of specific, grassroots actions which, as examples, would contribute to raising the visibility of the issue;*
- *to promote and facilitate co-ordination of related processes and activities undertaken by several institutions;*
- *to provide inputs and contributions to relevant international policy processes, in particular the Vth World Congress on Protected Areas and the Convention on Biological Diversity;*
- *to promote and support the mobilization of international financial co-operation for the fulfilment of these objectives at various levels, and to facilitate appropriate channels for funding when necessary.*

8. Sacred Sites in the Tanami Desert, Central Australia

by Derek Elias

Dr. Derek Elias is a consultant with UNESCO's Bangkok office, working with the Local and Indigenous Knowledge Systems (LINKS) project and the Coastal Regions and Small Islands (CSI) platform

Abstract

This paper addresses how Warlpiri people in Central Australia exercise control over their vast inventory of sacred sites in the context of gold exploration and mining where they are in a position, due to their ownership of land, to decide if and where such developments take place. I wish to highlight how the knowledge and ownership of these sites is articulated in the face of mineral development. In particular, I would like to indicate how intimate Aboriginal knowledge of plants and animals and water sources must first be understood as rooted within long-held cosmological beliefs and social practices. It is only from this basis that the significance of several hundred non-conventional protected areas that exist in the Tanami Desert can be put into context.

Introduction

The interface of biodiversity and cultural diversity includes three important dimensions:

1. CREATION OF BIODIVERSITY BY PEOPLE
   Selective breeding of genetic biodiversity: potatoes, rice, food, herbs, medicines, dogs etc (plants and animals).
2. MANIPULATION OF BIODIVERSITY
   Transformation and management of land, use of fire, water, irrigation etc., which results in the creation of mosaics.
3. RELATIONS BETWEEN PEOPLE AND PLACE
   The meaning of important places: sacred sites are not only protected areas used specifically for biodiversity conservation (often a misconception); they are also integral to people's worldview, identity, and socio-cultural relations. This includes issues concerning tenure, authority, and other responsibilities and obligations between people and the environment.

The critical point I wish to emphasize is that in Central Australia sites are protected on the basis of cultural beliefs and practices. But their intimate connections with biodiversity and the unique desert micro-ecosystems they contain have yet to be fully investigated.

The Study Area

There are three major settlements in the study area: at the edge of the Tanami Desert, at Yuendumu and Willowra to the south, and at Lajamanu to the north, as well as the mines at Tanami and The

Granites. Yuendumu and Lajamanu have permanent Aboriginal populations of between eight hundred and one thousand people each, whereas the population of Willowra fluctuates between two hundred and four hundred people. There are also a number of outstation communities lying in the heart of the desert that are inhabited sporadically throughout the year, with populations ranging from zero to fifty people.

Gold and Warlpiri in the Tanami Desert

Gold mining in the Tanami Desert consists of three fully operational mines (Tanami, The Granites, and Dead Bullock Soak) as well as numerous pits and two processing facilities. For Warlpiri gold represents an infusion of economic significance at their sacred sites. Gold is transformed into royalty monies generated from its extraction at or near sites that have been the source and object of profound social and cultural significance from time immemorial.

Agreements

Currently, in the Tanami Desert, in excess of seven million dollars in royalties can be distributed to Aboriginal communities and individual Aboriginal people each year. The Central Land Council (CLC – the Aboriginal representative body in Central Australia), as instructed by Warlpiri landowners, has entered into agreements with a large number of companies that allow for exploration and mining on Aboriginal land in the Tanami Desert. The two most important features of these agreements, as far as Warlpiri people are concerned, centre on the protection of their places of significance and the payment of royalties to the relevant traditional owners of the land affected by either mining leases or exploration licences.

The developments associated with the exigencies of mineral exploration on Aboriginal land have forced, and are continuing to force, traditional owners to make many decisions about their land, such as the relative importance of places and the bases for membership of royalty-receiving associations. This is occurring at a time when the older generation of landowners, who actually grew up in the desert, have almost all passed away, resulting in some instances in a loss of first-hand knowledge of the locations of places of significance. The objectification of Warlpiri knowledge of place and peoples' relationships to place is significant, because it is at the centre of tensions and politicking between people resulting from efforts to identify those eligible to receive money from specific tracts of land based on criteria upon which such eligibility is contested and upheld.

For almost ten years I undertook research on behalf of the CLC, which involved the mapping of place in the Tanami Desert and the identification of the correct groups of traditional owners of those places as primary objectives, and within the context of escalating gold exploration and mining. Over one hundred and sixty exploration licences now cover the study area of the central Tanami Desert, reflecting fifty-three separate agreements, with a further one hundred awaiting consideration. Seven mining leases have been approved within an area of 85,250 square kilometres. Extensive consultations, which begin with seeking the consent of the appropriate traditional owners,

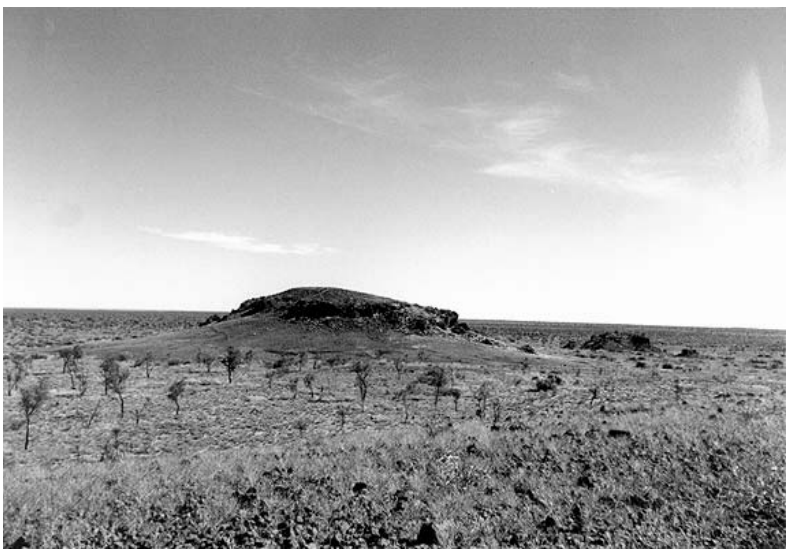
are necessary before any work by mining companies or other external development interests can take place on Aboriginal land. This is followed by the mapping of sites and the identification of those sites that are to be protected or avoided during exploration and mining work. As a result of these activities and other factors, the Warlpiri's relationships to the land, from which they now derive financial benefits, have changed greatly since the arrival of land rights.

Sites and Jukurrpa

The Tanami Desert is classed as a semi-desert, and covers a large area of land in the central-west of the Northern Territory of Australia as well as a much smaller area in Western Australia's north east. The major part of the Tanami Desert has been inhabited by Warlpiri-speaking Aboriginal people for thousands of years — from time immemorial or, in their terminology, since the creative period or *jukurrpa*, which transformed the world from a featureless mass to the form found today. For Warlpiri, the landscape of the Tanami Desert is covered with sites that mark the events and histories of the extraordinary *jukurrpa* beings and ancestors, whose essence remains in these places, in the land and the worlds above and below the surface of the earth.

Yukaka, Kaninjarra, or Kanunju are the most important places, at the intersection of jukurrpa activities that have pierced, broken, absorbed, exploded, erupted, and emerged from the surface of the earth.

The essence of Aboriginal identity lies with the anthropomorphised activities of the dreamtime beings who move around the landscape infusing the land with meaning and essence. The residual effect is that these stories of the *jukurrpa* (as accounted for in designs, songs, stories, and ceremonies of people) are the interface between the past, present, and future as well as prescribing knowledge, authority, and belonging through the generations (Munn 1984).



Place and space in the Tanami Desert must be engaged as phenomena that entail complex social and conceptual dimensions as compared with sites that are confined to a position in the landscape. The explanation of the ways in which the *jukurrpa* imposes an order on the physical landscape is the basis for an understanding of how it transmits a template of meaning and potential for action in Warlpiri social and mental landscapes and their reproduction of the *jukurrpa* as a master concept.

Jukurrpa is the categorical name for the ancestral heroes and the paths they travelled, it is also the name of the creative period they took part in. It was the time of the foundation of Warlpiri history and cosmology. Prior to the emergence of ancestral heroes, the earth was

conceived as a featureless mass. The earth and sky existed as given in the Aboriginal worldview, and the ontological concept of the Dreaming gave the world its current form, a form that may also be transformed in the future. It was the activities of *jukurrpa* that created not only the physiographic features of the land but also the floral and faunal species, including human beings. The events of the *jukurrpa* literally gave the world and everything in it form and significance. These events encompassed a complicated and interwoven range of human and supernatural actions by the ancestral heroes that transformed the landscape.

For Warlpiri, the landscape of the Tanami Desert is covered with sites that mark the events and histories of the extraordinary jukurrpa beings and ancestors, whose essence remains in these places, in the land and the worlds above and below the surface of the earth.

> *These beings were responsible for the origin of customs and social institutions. They moved across the land in the Dreamtime period, from place to place, or camp to camp, having adventures, performing various rites, and meeting others of their own kind; and they left behind them part of their own sacred essence, which is still present at certain sites* (Berndt 1970: 2).

The significance of the activities performed by the heroes is the cornerstone of Warlpiri cultural practices and social relations.

The ancestral transformations of the *jukurrpa* that produced the major features of the country were divided by Munn (1984: 58) into three categories: metamorphosis, imprinting, and externalisation. These categories of transformations were differentiated according to the kind of interaction that took place between the *jukurrpa* and the land in creating sites in the landscape. In others words, the ancestral heroes "took on or produced material forms consubstantial with themselves" (Peterson et al. 1978: 6). Metamorphosis occurred when the hero became part of the landscape. Imprinting involved the *jukurrpa* doing something to the land with their body or some kind of tool or object. Transformations characterised by externalisation were events in which the ancestor left part of their body, regardless of whether the action was intended or not.

Existence in the Tanami Desert was, for all forms of life, dependent on the availability of water. The loss of these waters due to silting up of soakages (small man-made well holes) is perhaps the most recent environmental change in the Tanami Desert, the result of Aboriginal people no longer moving through the country, hunting and gathering and maintaining water supplies. The importance of these water sources for the maintenance of biodiversity in the desert cannot be overemphasised. Table 1 provides details of the sites of the Tanami Desert in terms of their association with water sources. The table is organized in descending order in terms of numbers of sites only. It does not reflect importance in terms of frequency of use, water quality, or storage capacity.

Type of Water Source	Number of Sites	Percentage of Total
No water source	65	23.89
Soakage - (on plains or claypans)	62	22.79
Soakage - (in creeks or next to hills)	55	20.22
Ephemeral - (claypans or small lakes)	39	14.33
Rockhole - (also found in creeks)	37	13.60
Permanent Spring	5	1.83
Large Rockhole	5	1.83
Lake	3	1.10
Waterhole	1	0.36
TOTAL	**272**	**100**

Table 1. *Water Sources of the Central Tanami Desert*

Biologists previously attributed to sacred sites a function as food sources for people in the desert. In fact, for Warlpiri, many sites actually serve as focal points for ceremonies to increase the numbers of plants and animals. Coupled with taboos on taking specific types of food close to these sites, it is clear that a lot of sites did serve to maintain biodiversity.

Two hundred and fifty-seven sites have been accurately located within the 85,250 square kilometres of the study area: averaging one site per 331 square kilometres. It is estimated that, within the study area, between eight hundred and one thousand named soakages were relied upon by the Warlpiri for their existence. There are forty-five dreaming tracks (*jukurrpa*) associated with the 257 mapped sites. It is estimated that these sites represent approximately only one quarter of the sites that can be named through the entire repertoire of Warlpiri knowledge.

As can be seen from Table 1, less than a quarter of the sites surveyed do not contain water, although this fact is misleading, as will be explained shortly.

The features of the terrain indicated by *yapa* as sites of significance encompass all manner of incarnate aspects of the landscape, including combinations of the following: trees, groves of shrubs, stone arrangements, quarries, caves, outcrops, lakes, billabongs, claypans, gorges, ravines, mountains (as named on maps), ranges, hills, rock holes, soakages, creeks, rivers, waterholes, sand hills, termite mounds, and sinkholes. All of these sites of significance are named and seen as having been created by the travels of one or more *jukurrpa*.

Feature of named Site	Number of Sites	Percentage of Total
Soakages (sometimes with adjacent hills)	90	31.69
Mountains, ranges or prominent hills	49	17.25
Lakes, swamps, claypans or billabongs	44	15.49
Rockholes or soakages in creekbeds	29	10.21
Free-standing rocks or stone arrangements	24	8.45
Rockholes in hills or ranges (including springs)	20	7.04
Rockholes (isolated)	17	5.98
Caves	6	2.11
Trees	5	1.76
TOTAL	**284**	**100**

Table 2. *Gradations of site significance*

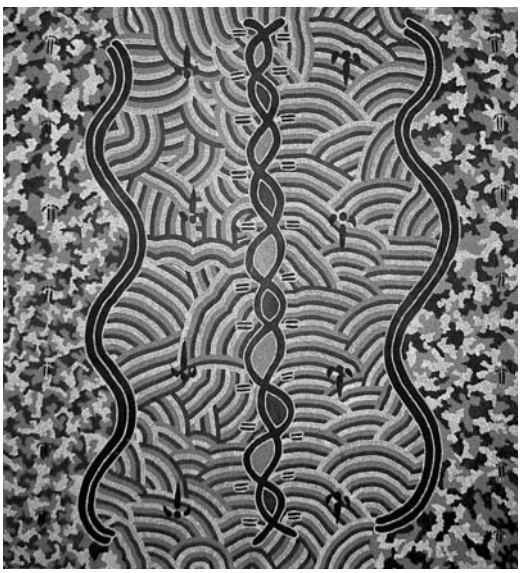
The vast majority of the located sites of significance are linked to prominent physiographical features, as these are more easily described and located. This is indicated by the features listed in Table 2. However, more importantly, the majority of sacred sites that remain unmapped by researchers (numbering in their thousands) are soakages dug by people foraging across the desert. These supplied them with water as well as being critical water sources for plants and animals.

The knowledge of the spatial organisation of sites is primarily coded in exhaustive stories and song cycles, and materially manifested in sacred paraphernalia and associated designs. This knowledge is also passed on through sand mapping and drawings.

The sites of the Tanami Desert can be divided into categories that are easily conceptualised in terms of the degree to which a place may be said to be either 'open' or 'closed'. The most restricted places are those that are closed to members of the opposite sex as well as to those individuals who have not yet attained a sufficient age, level of ritual knowledge, or grade of initiation. Conversely, open places are attended by no such restrictions at all.

The next most important places are associated with a major event or activity on a single dreaming track, as major sites also include those that have an association with several important *jukurrpa*. Of lesser significance are those places that signify only a minor event or 'camp' in the travels of a *jukurrpa*. The least important sacred sites are those that indicate the path where a particular dreaming took

place, a site where instructive stories are related to children, or where a minor historical incident occurred. This ranking is not meant to exclude the importance of contemporary events or to deny the fact that changes in the significance of a place may occur through time. Importantly, sites are not simply rooted in time and unchanging, they can become significant through contagion — the storage of objects at a place — or, perhaps more commonly, by their connection to recent life cycle events such as a death or major initiation.



The knowledge of the spatial organisation of sites is primarily coded in exhaustive stories and song cycles, and materially manifested in sacred paraphernalia and associated designs. This knowledge is also passed on through sand mapping and drawings.

- Yukaka, Kaninjarra, Kanunju (inside, below).

These are the most important places, at the intersection of jukurrpa activities that have pierced, broken, absorbed, exploded, erupted, and emerged from the surface of the earth.

- Yaninika-wurna (along the ground).

Places created by jukurrpa that travel along the ground are generally ranked as secondary in importance, although some places between two surface-breaking events of the previous category can also be of extreme importance.

- Kankarlu (over the top, outside, above).

These places also involve non-earth bound places and celestial objects, the jukurrpa involved can be extremely important particularly when they impact with the earth's surface. However, of least importance are those jukurrpa that leave the surface of the earth to fly and land at another place. Although Warlpiri often point out are as of land where a jukurrpa travels overhead, they do not invest it with any significance in terms of the land itself.

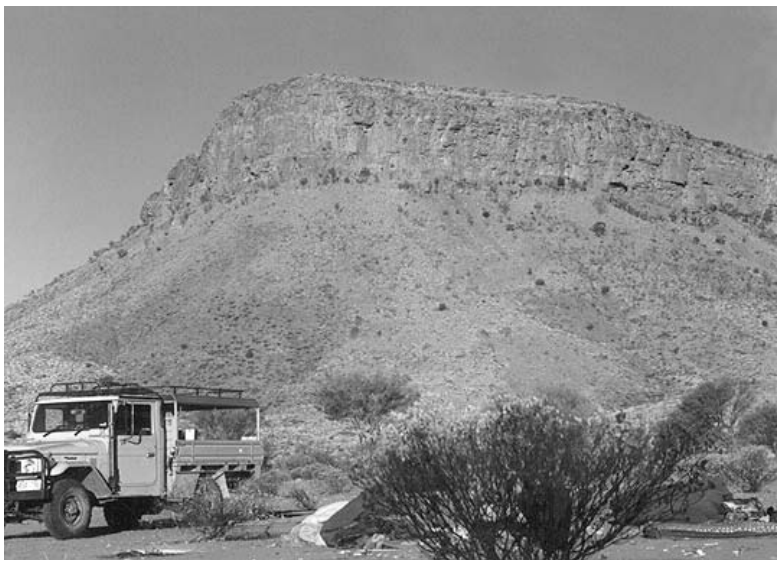
Warlpiri sites not only connect people to land in the Tanami Desert and other sites, they also connect people to each other. With respect to determining where mining companies can explore and mine, Warlpiri base their decisions about the extent of sites on the following considerations, among others, all of which refer to scales of meaning:

- *The importance of the site cosmologically*
- *The social relations of the Aboriginal owners and managers of the site*
- *The physical extent of the site*

The delineation of site boundaries for protected areas is no easy matter. Even more so due to the fact that insignificant-looking sites such as soakages may be ranked as being far more important in terms of sacred power than a spectacular rock formation or a prominent hill.

The production of boundaries over space and place, in addition to the processes of exploration and gold mining, has created an enormous amount of work in identifying and maintaining different kinds of physical, social, and spatial boundaries. Under Australia's Land Rights Act, Aboriginal land can neither be bought nor sold; yet the re-introduction of people to place has nonetheless

influenced not only relationships between people and place but also relationships among people. Mapping was the first part of this process to draw Warlpiri politicking over rights to places in the face of the institutional requirements of the CLC, the mining industry and the government to resolve questions of boundaries and ownership of place. Decisions on the identification and protection of places have, by and large, been the responsibility of senior knowledgeable persons. The identification of the appropriate owners of those places demands that Warlpiri people map their relationships to place with respect not only to their own places and boundaries but also to those created by the development process as well (Elias 2001).



The vast majority of the located sites of significance are linked to prominent physiographical features, as these are more easily described and located.

Place has remained a central and dynamic cultural concept for the Warlpiri, and its significance within the current context of ever-expanding gold mining developments has, if anything, elevated its importance in Warlpiri lifespaces.

Warlpiri sites are at the intersection of new economic values and existing cultural values. Knowledge of the location of places and their associated stores of symbolic meanings are contested and competed for …as place has come to have significant new economic dimensions. Gold-mining royalties generated in the Tanami Desert are at the centre of intense Warlpiri politicking regarding place, their cultural order, and the affiliation of Warlpiri to those places. Intimately involved in these processes is the complex conversion of cultural to economic capital in the form of land values and associated knowledge, in which land can become currency in itself.

The protected areas in the Tanami Desert can range from as little as five hundred metres in radius to massive site complexes covering over one hundred square kilometres in area. The majority of these sites lie at the intersection of different micro-environments that house the repertoire of remaining biodiversity in the desert. Knowledge of these sites is maintained by the ongoing socio-cultural traditions of the Warlpiri. Gold mining and exploration reinforce this knowledge, primarily by facilitating access and decision-making over sites as non-conventional protected areas.

The cultural meanings of sacred sites have been well documented for many years, yet the documentation of the biodiversity of this fragile environment, where so many protected areas have been designated, remains to be accomplished.

References

Berndt, R. 1970. The Sacred Site: The Western Arnhem Land Example. *Social Anthropology Series no. 4 Australian Aboriginal Studies* 29. Canberra: Australian Institute of Aboriginal Studies, 1–57.

Elias, D. 2001. Golden Dreams: People, Place and Mining in the Tanami Desert. Unpublished Ph.D. Thesis. Canberra: Australian National University.

Munn, N. 1984. The Transformation of Subjects into Objects in Walbiri and Pitjantjatjara Myth, in M. Charlesworth, H. Morphy, D. Bell, and K. Maddock (eds.) *Religion in Aboriginal Australia.* St. Lucia: University of Queensland Press, 56–82.

Peterson, N., P. McConvell, S. Wild, and R. Hagen. 1978. *A Claim to Areas of Traditional Land by Warlpiri and Kartangarurru-Kurintji.* Alice Springs: Central Land Council.

UNESCO's Local and Indigenous Knowledge Systems (LINKS) project, in association with the Warnayaka Art Centre, Lajamanu, Australia, and French anthropologist and producer, Barbara Glowczewski, has launched a CD-ROM exploring sacred sites in Central Australia, *Yapa Art and Knowledge of the Australian Desert.* This CD-ROM represents only a fraction of the complex cultural, ritual and ecological knowledge of the Warlpiri people. It is based on the network of the fourteen Dreamings most often painted by the people of Lajamanu. In fact, all named things in nature and culture have a dreaming, or jukurrpa, so there are thousands of stories and named dreaming places or sacred sites marking Warlpiri land. In the CD-ROM, the transposition of Aboriginal cognitive mapping into an interactive map allows the user to experience the interconnectivity of indigenous cosmology.

9. Biodiversity Conservation: Lessons from the Buddhist 'Demajong' Landscape in Sikkim, India

by P. S. Ramakrishnan

Introduction

Traditional societies are characterized by their close interconnection with nature and natural resources. They depend upon natural resources and biodiversity for their sustainable livelihood concerns (Ramakrishnan 1992a; Ramakrishnan et. al. 1994, 1996). This bond with nature and natural resources extends beyond the economic realm; social, cultural, and spiritual dimensions also play a significant role (Ramakrishnan et al. 1998).

Traditional mountain societies have a holistic view of the ecosystem and the social system. This relationship with nature is based on coexistence rather than competition, resulting in agricultural strategies that are adapted to the natural environment and the sustainable use of natural resources. An expression of this relationship can be seen in the concept of the 'sacred landscapes' that are identified by many traditional societies, and are often protected for cultural or religious reasons. The result is a set of institutional arrangements evolved towards ecological prudence. The ultimate objective is the sustainable use of natural resources in order to arrive at compromises between environmental risks and productivity concerns.

Professor P. S. Ramakrishnan is a professor with the School of Environmental Sciences of Jawaharlal Nehru University in New Delhi. He is on the Scientific Committee of the International Human Dimensions Programme on Global Environmental Change (IHDP) and is Chair of the Indian National Human Dimensions Committee

1. Knowledge Systems: 'Formal' and 'Traditional'

Formal knowledge in ecology has largely been a prerogative of natural scientists who analyze natural phenomena using a hypothetico-deductive method. Social scientists, by contrast, deal with a subjective world with obvious differences in the way they create knowledge. 'Formal knowledge' could be viewed as that obtained through a hypothetico-deductive process, while 'traditional' knowledge, though it has a strong element of the former, is largely derived through societal experiences and perceptions accumulated by different traditional societies in their interactions with nature and natural resources. Traditional knowledge is therefore based on trial and error. While 'formal' emphasizes a certain degree of universality of knowledge created by an accepted methodology, 'traditional knowledge' incorporates a certain degree of location-specificity, with a strong human element and an emphasis on social emancipation (Elzinga 1996).

Then there is the psychological dimension to knowledge. In the ecological context, anthropologists see culture as determining human responses to the ecosystem within socially defined situations, both in terms of space and time. This adds a third dimension to traditional knowledge: the psychological — the basis for differing cultural perceptions of the environment and differing value systems derived from it. Understanding this knowledge adds to the cultural and spiritual dimensions of the knowledge system and provides the protective impulse for many human societies to conserve natural resources and manage ecosystems (Ramakrishnan et. al. 1998).

1.1 'Formal' Knowledge

Much of the information in this area is derived from looking at the biophysical dimensions of ecosystems. The acceptance that disturbance is an integral component of ecosystem functioning has implications for our understanding of population dynamics, successional processes, energy flow, nutrient cycling, and biomass and production functions in natural-resource management. In spite of our understanding of ecosystem dynamics, we are increasing aware that there is a worldwide crisis in resource management. Many biophysically oriented ecologists maintain that sustainability is neither a realistic goal nor a useful concept for ecosystem and natural-resource management (Holling et. al. 1998). It is in this context that the concept of TEK becomes significant (Ramakrishnan 1992a 2001).

1.2 Traditional Ecological Knowledge (TEK)

Traditional societies, often referred to as indigenous or tribal people, have accumulated a wealth of empirical knowledge from their experience with nature and natural resources. This traditional wisdom is based on the intrinsic recognition that man and nature make up an indivisible whole and therefore should live in unison. This ecolo-centric view of traditional societies is widely reflected in their attitudes toward plants, animals, rivers, and the earth. These timeless instances of man-nature ethics are passed on via iconography and sculptural imagery (Vatsayan 1993).

A large amount of descriptive literature has been gathered on the use of food and medicinal species by traditional societies (National Academy of Sciences 1975; Hladik et al. 1993). Additionally, a lot of environmental knowledge can be gleaned from examination of traditional land-management practices. Another aspect of TEK that needs to be addressed is how ecosystem processes are altered by societal perceptions and decision-making processes: in other words, how does the socio-ecological system function as an integrated whole? Only recently have ecologists begun to look at the dynamics of these socio-ecological relationships operating at various spatial (sub-specific, species, ecosystem, and landscape levels) and temporal scales (adaptations over a period of time).

Our understanding of TEK is based on the economic, ecological, and socio-cultural benefits, both tangible and intangible, that traditional societies may derive from the surrounding landscape (Ramakrishnan 2001).

(I) ECONOMIC

Traditional crop varieties, lesser known plants and animals of nutritional value, and medicinal plants harvested from the wild can provide an important economic basis for mountain societies, and help them buffer difficult periods of food scarcity.

(II) SOCIO-ECOLOGICAL

The way that mountain societies conserve and manipulate biodiversity and ecosystem complexity contributes toward ecosystem resilience and strengthens the capacity of mountain people to cope with environmental change.

(III) SOCIO-CULTURAL

Cultural, spiritual and religious belief systems of mountain people are centred on the concept of sacred species, sacred groves and sacred landscapes, which can play an important role in biodiversity conservation.

1.3 Sustainability Issues Linked to Knowledge Systems:

What does this imply for 'sustainability science'? The current perspectives on 'sustainability science' derive from a largely 'reductionist' approach to ecology based on the exploitation of a given resource at the expense of others within a given ecosystem. Here the emphasis is on the biophysical dimensions of the ecosystem concept. However, for effective socio-ecological system management, combining this reductionist perspective of knowledge with a more traditional 'generalized' perspective towards natural resource management is likely to yield better results. For this, societal perceptions, which are often location and issue-specific, need to be integrated into an adaptive management strategy that ensures community participation in the sustainable management of natural resources. We need to link up our understanding of 'formal' knowledge with location-specific considerations arising from the traditional knowledge system in order to find solutions to the sustainable management of natural resources. The landscape-development-oriented study undertaken in north-east India, whereby an integrated perspective of the two knowledge systems taken together links ecological with social dimensions, is one of the best examples of its kind (Ramakrishnan 1992a 2001). The ability of traditional societies to view the landscape as a socio-cultural complex, an integrated part of a 'cultural landscape', is expressed in the concept of the 'sacred' and forms a strong basis for biodiversity conservation and management (Ramakrishnan 1996; Ramakrishnan et. al. 1998).

2. The Concept of 'Sacred'

There is wide recognition worldwide and across disciplines that regions of ecological caution exhibit a symbiotic relationship between the biophysical ecosystem and the social system, with strong cultural interconnections between the two. This demonstrates that culture and environment are complementary, and in various stages of evolution (Ramakrishnan 2001). However, these traditional societies are no longer immune to changes occurring everywhere and continually. The predomi-

nant culture of the over-consumption of natural resources is making an impression in these societies, resulting in the erosion of their time-tested and value-based institutions.

Social institutions in connection with biological resource management are often linked to religious myths and socio-cultural belief systems. Such a concept of 'the sacred' often has spatial dimensions and specificities. We can conceptualize a broad hierarchy of social institutions and sacred entities (Ramakrishnan 1996). For example, (i) a spatially diffused sacred landscape, (ii) a spatially defined sacred landscape, (iii) sacred groves, and (iv) sacred species.

Sacred groves are part of a landscape, often a forested ecosystem, with well-defined geographical features, delimited and protected by traditional societies through traditional institutional arrangements, often not codified, utilizing a whole set of myths and beliefs, (Ramakrishnan et. al. 1998). Often associated with a mountain landscape, these groves are found in many parts of the world (Hughes 1998). Divergent viewpoints exist on the origin of this concept amongst traditional societies — arguments ranging from fear and respect for God and ancestral spirits to more secular causes such as the utilitarian values of the biodiversity contained within them. In any case, these groves have functioned in the past and continue to function as sites for socio-cultural and religious interactions. However, once widespread, these groves have disappeared more or less completely from certain parts of the world — such as in Europe — and benefit from varied levels of protection in other areas where they still exist. In the contemporary context, one could view these islands of biodiversity as a source for much-needed germplasm for the rehabilitation of degraded systems (Ramakrishnan et. al. 1994).

Sacred species that are socially, culturally, or spiritually valued, on the other hand, are viewed separately. However there may be restrictions on their usage. These species may or may not have direct economic value — for medicinal reasons, for example, such as Neem (*Azadirachta indica)* or Sacred Basil (*Ocimum sanctum)* — or they represent ecologically important keystone species enhancing associated biodiversity, which determine nutrient cycling patterns and soil fertility. In other words, these species influence ecosystem-level processes (Ramakrishnan et. al. 1998).

Sacred landscapes have a particular significance in terms of biodiversity conservation. It is in this context that the 'Demajong' landscape of the Tibetan Buddhists in the Sikkim State of the Indian Himalayan region becomes significant.

3. Sacred Landscapes as a Tool for Biodiversity Conservation

Biodiversity-rich mountains have always been home to the gods for many of the world's traditional societies. This sacredness is recognized in the sacred landscapes identified by a variety of mountain societies (Bernbaum 1997) among religious faiths the world over. Though these sacred landscapes have usage restrictions, they form an integral part of traditional cultures. The 'Demajong' landscape in west Sikkim is based on Tibetan Buddhist philosophy, with clearly defined norms and a well-defined boundary for sacredness (see Figure 1). The air, soil, water, and biota are all sacred;

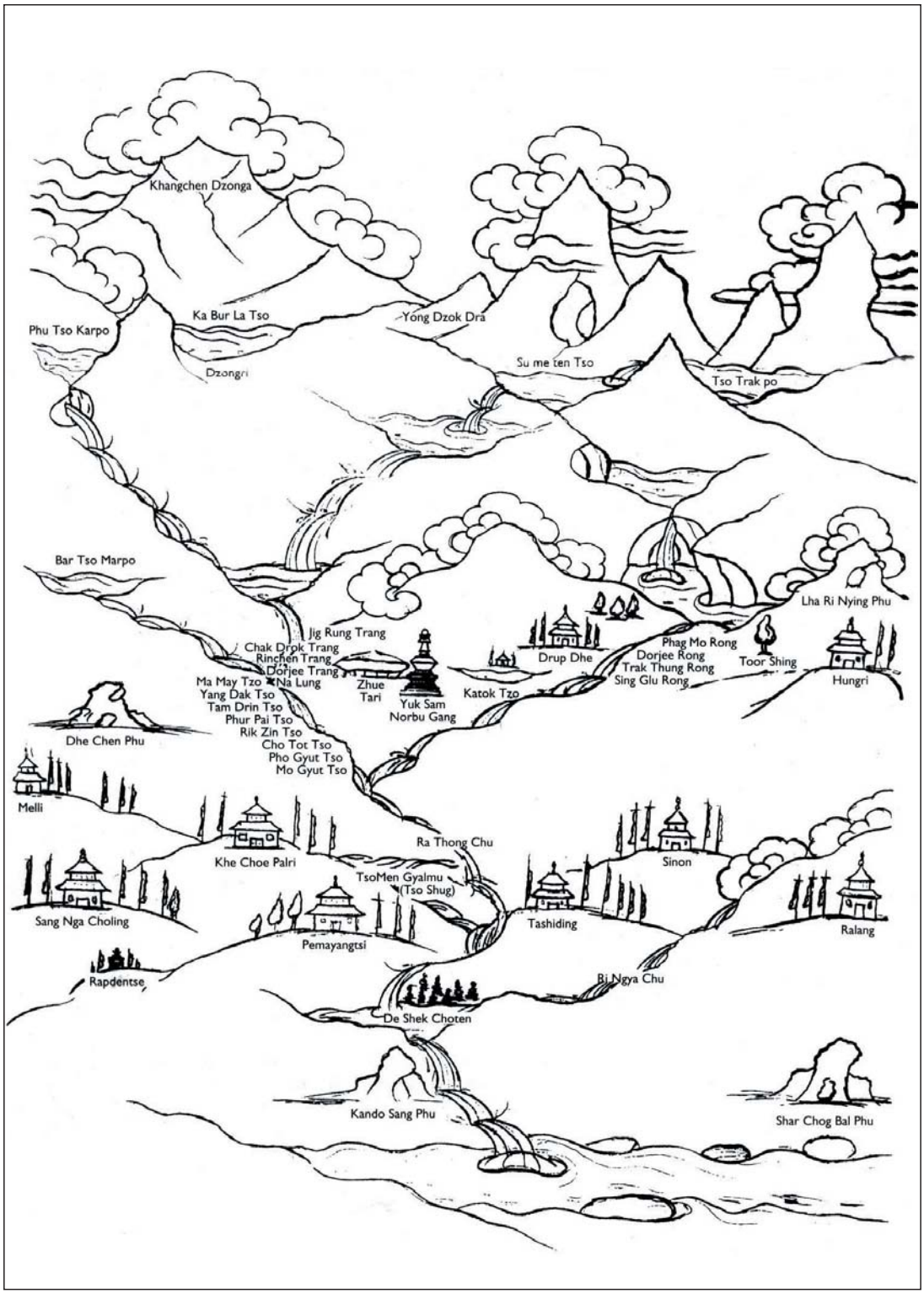


Figure 1. *'Demajong', the land of the 'Hidden Treasures' — A pictorial depiction of holy sites in West Sikkim, according to the "Neysol' text of Tibetan Buddhism. Names with 'Tso' signify a lake, while 'Chu' is a river. This sacred landscape stretches from Khangchendzonga peak down to sub-tropical forest, natural and human-managed ecosystems, and historical monuments. (Drawing courtesy of Concerned Citizens of Sikkim, Gangkok)*

any disturbance in the landscape is restricted and bounded by cultural norms, and the guiding principles for natural-resource use are determined by social institutions. With a variety of rituals linked to the diverse communities living within this landscape boundary, who have their own pre-determined rights to use natural resources, larger community participation is ensured (Box 1).

Of the Rathang Khola catchment area — the mythical 'Demajong' (totalling 328,000 hectares) — 28,510 hectares is under snow cover. The vegetation is varied, ranging from alpine Rhododendron scrub vegetation at higher reaches to sub-tropical moist evergreen forests below. These forests cover a distance of about fifteen kilometres, and are extremely rich in plant biodiversity, including medicinal plants of value to traditional Tibetan pharmacopoeia. Due to external pressures on these resources, these ecosystems are degraded in many areas.

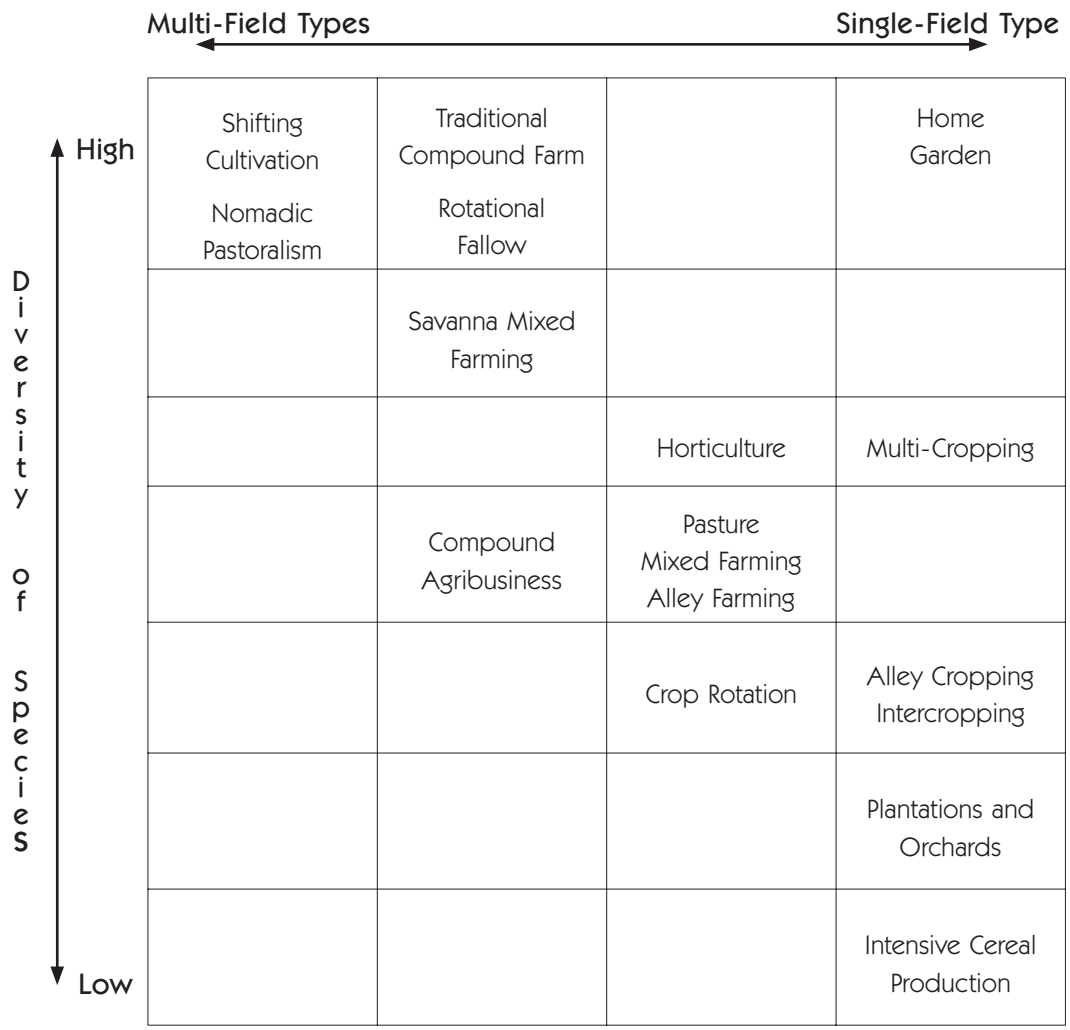


Figure 2. *Broad agro-ecosystem typologies linked to species richness and agro-ecosystem complexity (source: Swift and Ingram 1996).*

THE DIFFUSED LANDSCAPE CONCEPT:

One of the best examples linking highland and lowland systems is the Ganga river system in India. Originating at Goumukh in the higher reaches of the Garhwal Himalaya, the Ganga flows through the northern plains of the states of Uttar Pradesh, Bihar, and West Bengal before draining into the Bay of Bengal in the east. The sacred land, the river tributaries, the human dwellings, all the natural and human-managed ecosystems, the chain of temples dating back to antiquity, the holy cities of the mountain zone (among them Gangotri, Jamnotri, Kedarnath, Badrinath, Rishikesh, and Haridwar), and those in the plains (such as Allahabad and Varanasi), together represent a set of interconnected ecosystems bound together by the sacred river itself. Worshipped by the Hindus and Buddhists of the Asian region and tucked away in the folds of the Himalaya, the symmetrical Mount Kailas rises above the Tibetan plateau, and is the legendary Mount Meru or Sumeru — the 'Mandala' of the Buddhists (the cosmic axis around which the axis of the universe is structured for both Buddhists and the Hindus). This mythologically interconnected belief system has even penetrated into the belief system of the distant Balinese of the Indonesian island complex. As the origin of all the major sacred rivers of Hindu mythology, these river systems form the basis of human civilization in this part of the world.

THE 'DEMAJONG' LANDSCAPE:

Padmasambhava, worshipped by Sikkimese Buddhists, is considered to have blessed Yoksum and the surrounding sacred land and water bodies in West Sikkim District in eastern Himalaya, having placed a large number of hidden treasures (*'ter'*) in the area. It is believed that these treasures are being discovered gradually and will be only be revealed to the enlightened Lamas, and only at appropriate times. For the Sikkimese Buddhists, conserving these treasures and protecting them from polluting influences is considered important for human welfare. The area below Mount Khangchendzonga in West Sikkim, referred to as 'Demojong', is the core of the sacred land of Sikkim. Here offerings are made to the protective deities, but no meaningful performance of Buddhist rituals is possible if the land and water is desecrated. Village-level activities on the land and water resources are permitted.

Any large-scale human-induced disturbance in the land of the holy Yoksum region would destroy the hidden treasures (*ters*) in such a way that the chances of a visionary recovering them some time in the future will diminish (the last such discovery is thought to have occurred 540 years ago). Any major disturbance to the river system would disturb the ruling deities of the 109 hidden lakes of the river, thus leading to serious calamity. Indeed, the very cultural fabric of Sikkimese society is obviously dependent upon the conservation of the whole sacred landscape. The uniqueness of this heritage site lies in the holism and interconnection between the soil, water, biota, visible water bodies, the river, and the lake systems on the river bed, together with physical monuments such as monasteries.

Box 1.
Sacred landscape as the basis for biodiversity conservation (Ramakrishnan 1996; Ramakrishnan et. al., 1998)

3.1 Redeveloping Complex Agro-Ecosystems and Crop-Biodiversity Management:

A wide range of complex agro-ecosystem types exist in this sacred landscape, managed at subsistence level by traditional societies. The biodiversity found here is comparable to that of nearby natural ecosystems, occasionally exceeding them. This biodiversity contributes in a variety of ways towards ecosystem functioning, in terms of production, decomposition, and nutrient cycling dynamics. Biodiversity thus enhances ecosystem stability and resilience. Specific examples of these agro-ecosystem types, with varied levels of management ranging from casual to high intensity, modern monocropping systems, are indicated in Figure 2.

The cultivation of multiple species by farmers necessarily involves consideration of biodiversity issues. Choices of crop combinations represent a planned biodiversity strategy. Together with crop and management practices, crop combinations have an effect on other organisms; causing changes in population structure and size in what may be termed the associated biodiversity of the system. These structural changes in turn influence production.

Managing these complex agro ecosystems, with the ever-present concern to increase production of subsistence crops, is crucial for the *in situ* conservation of agro biodiversity (Swift, Vandermeer et. al. 1996). But high-energy-input modern agricultural systems represent only one of the possible paths that agricultural development can take, at least two other paths are possible towards achieving a sustainable agricultural system: (a) evolution by *incremental change*, whereby we build upon the available system, step by step, using TEK so as to avoid serious ecological and social disruptions, or (b) the redevelopment of the system through the *contour pathway*, organizing typologies to fit into existing ecological and social contours, but taking TEK into account.

MODERN AGRICULTURE

For decades, agricultural research and extension efforts have been steered toward modernization. The resulting production types stand apart from the rest of the landscape as an artificial entity. They represent an attempt to convert the natural ecosystem into a controllable set of biological and chemical elements, almost irrespective of the background ecological conditions. In this agricultural strategy, narrow production targets are pursued, and the background ecological conditions are only taken into account to provide information on production potential. Intensified crop production through external energy inputs ensures high productivity levels, though based on short-term considerations and at a cost to the environment.

THE 'CONTOUR PATHWAY'

In contrast to modern agriculture, understanding the relationship between structure and function in natural ecosystems provides valuable guidelines about what might be planted, the problems that might be encountered, and the attainment of realistic goals (Swift et. al. 1996). Working with nature, rather than dominating it, involves active planning, taking the background ecosystem into consideration. Building upon traditional knowledge with appropriate inputs from the formal knowledge system forms the design basis for agro ecosystem models that fit into the biophysical contours of a given location. In a sense, this pathway attempts to integrate traditional and modern agricultural

strategies. It seeks to work with the ecological forces that provide the basis for the agricultural system, while acknowledging the social, economic, and cultural requirements of local farming communities. Many agroforestry systems based on low- and medium-intensity management fall into this category: agro-pastoral model systems, compound farms, and traditional systems based on the 'home garden' concept are some examples.

There have been many attempts to design sustainable agricultural systems to meet the specific needs of mountain societies. Sloping Agricultural Land Technology (SALT), developed in the southern Philippines, is one such system (Tacio 1993). SALT is based on the planting of annual and perennial crops in three to five bands between double rows of nitrogen-fixing trees and shrubs. Crops are planted along contours to enhance soil conservation. The objective is to establish a stable ecosystem that minimizes soil erosion, ameliorates the chemical and physical properties of the soil, and increases food security for farmers.

These objectives were realized in the initial experimental phase in the Philippines, and attempts are now being made to introduce this technology into other Asian regions (Pratap and Watson 1994). However, initial reaction to this practice has been disappointing. This lack of success is primarily linked to uncertain land-tenure systems and the predominance of small and fragmented land holdings, the economic cost involved, and an inappropriate selection of tree species for contour management. In the final analysis, the technology suggested is built exclusively around "formal rather than traditional ecological knowledge". For these reasons, SALT has not been able to make an impression within the Indian subcontinent.

THE 'INCREMENTAL PATHWAY'

Many traditional agricultural systems initially need to be re-developed through TEK-based incremental changes, because any drastic change may not be acceptable to local communities. Short-term compromises might need to be considered in response to the restraints of ecological, economic, social and/or cultural factors, while not losing site of a more ideal long-term strategy. The chief difference between the incremental and the contour pathways lies in the relative proportion of traditional versus formal knowledge used in designing improved agricultural technologies. The incremental pathway incorporates TEK more strongly.

The most comprehensive study to date on the 'incremental pathway' as a potential route for agricultural development in tropical mountain systems is a case-study of the shifting agricultural system of Nagaland in north-eastern India. The conclusions of this study have broad implications for a land-use system that is prevalent in Asia, Africa, and Latin America.

The Nagaland initiative in North-East India (Box 2) arose from an in-depth analysis of the environmental impacts and redevelopment possibilities of shifting agriculture (Ramakrishnan 1992a). The initiative aims at a participatory development plan for the entire state of Nagaland, on the basis of a decentralized village-development plan. Building upon TEK in local communities, and based on appropriately designed village development boards (VDBs) that take account of the value systems of a large variety of local ethnic groups, this initiative has led to redeveloped forest

Box 2. *A local government initiative to improve shifting cultivation — called "jhum" in Nagaland (NEPED and IRRR 1999; Ramakrishnan 2001).*

Land-use redevelopment of jhum-affected land in Nagaland State in north-eastern India was initiated through participatory processes and dissemination, as well as the incorporation of gender issues. Village Development Boards, formed on the basis of local value systems, were seen as appropriate vehicles for this land-use redevelopment.

- The local government, with support from the India-Canada Environmental Facility, initiated a project to strengthen shifting agriculture (jhum) in Nagaland, with a strong focus on TEK. The project involves 1200 villages and around 200 experimental plots in 5500 hectares of farmland.
- Farmers have adopted tree-based intensified jhum systems. These systems are based on agroforestry principles, further tested by villagers in 870 villages on a total area of 33,000 hectares (an average of 38 hectares per village). In these experimental plots, local adaptations and innovations to agroforestry practices, such as soil and water management, are being tested and assessed.
- Edible legume cover crops are being cultivated in mixed as well as pure cropping systems as part of an extended jhum cropping phase of three to four years, to increase nitrogen fixation and, consequently, to prolong soil fertility.
- Nepalese Alder (Alnus nepalensis), a common tree species in the north-eastern region, is often planted and/or protected in cultivated and fallow jhum plots. This species fixes up to 120 kilograms of nitrogen per hectare per year. The use of Nepalese Alder is only a starting point, and additional tree species have been identified for recovery of the fallow phase of jhum.
- Ten tree species commonly used for construction and fuel wood, and which can be harvested five to ten years after planting, were selected. Twenty additional tree species that have a value as timber have been identified and introduced into jhum plots in consultation with local communities. Trees were grown singly or in mixtures in jhum plots. Mixed tree plantations were shown to be superior to monocultures for fallow recovery, and are recommended.
- The widespread thatch grass (Imperata cylindrica), a perennial weedy grass that commonly grows in less-fertile and dry areas throughout the tropics, is being controlled by dense cropping of Cassava, which is part of the jhum cropping system.
- Non-traditional crops, such as tea and oyster mushrooms, are also being tested as part of the agroforestry project
- Improving the yield from the home garden systems through vegetable cultivation is another option to provide income for local people; multipurpose bamboo cultivation, including bamboo shoots as a food item, has also been suggested.
- Biodiversity conservation is a key objective in redeveloped jhum systems, as biodiversity suffers under traditional jhum systems with shortened cycles.
- Traditional means of rainwater harvesting and erosion control have been incorporated into the improved jhum practices, where appropriate.

fallow-management practices, building upon shifting agriculture and conserving natural and human-managed biodiversity in this biodiversity 'hot spot' of India.

To ensure sustainable land-use in tropical mountain environments, we need to increase our understanding of the organization and functioning of these human-managed ecosystems. Future agricultural development needs to be based on TEK in order to meet and ensure sustainable livelihoods in mountain societies that are concerned with environmental conservation. This will have the effect of reducing the vulnerability of mountain people to global change impacts (Swift et. al., 1996; Ramakrishnan 2001).

3.2 Forest Rehabilitation/Management and Natural Biodiversity Conservation:

A significant proportion of natural forest ecosystems in developing countries, including those in protected areas, is located in mountains and is degraded to secondary formations (Chokkalingam et al. 2000; Ramakrishnan 2001). In addition, many natural forests in both the developed and developing world have been converted to forest plantations to varying degrees. The conversion into plantations essentially implies the replacement of species-rich natural ecosystems with species-poor monocultures. Firstly, many of these plantations require intensive management and are therefore dependent on a variety of external inputs. It is only in recent times that mixed forestry plantations have begun to be explored as a sustainable route for forest management. They offer possibilities for developing biodiversity-rich forests, and present an opportunity to widen their economic base through non-timber forest products (NTFPs). Mixed forestry programmes also offer possibilities for community participation, without which conserving forests in the developing tropics would be a difficult task (Ramakrishnan 2001).

It is being increasingly recognized that natural forest management, and indeed rehabilitation of degraded natural systems, demands consideration of ecological, socio-economic, and even cultural dimensions, and the interactions between these factors (Figure 3). Recognizing this complexity is even more critical in developing countries, where a large proportion of the human population is directly dependant upon forests, not only for timber but also for non-timber forest products (Patnaik 2002). When evaluating tropical mountain forests, it is important to move away from a mere profit-based assessment of timber value and towards an appreciation of the combined ecological, socio-economic, and spiritual value of the forests.

Indeed, the cultural and spiritual importance of a large number of species could form an important basis for forest conservation and management. There is increasing evidence that key ecological species are often selected by mountain societies (Ramakrishnan et. al. 1988). For example, fig trees are sacred in many Asian and African societies. They also happen to be important key species within the forests. Such species play a key role in determining ecosystem health associated with biodiversity and ecosystem processes such as nutrient cycling. Consequently, these species also play an important role in agroforestry and forestry rehabilitation (Ramakrishnan 2001). The culturally valued *Quercus* (oak) species in the Central Himalayan region, and the early successional Nepalese Alder (*Alnus nepalensis*) in the Eastern Himalayan region are key ecological species, influencing nu-

trient cycling processes and thus ensuring soil ecosystem health through improved soil fertility (Ramakrishnan et. al. 2001). They are often abundant in protected areas and sacred landscapes. Through their role in ecosystem functioning, these species contribute towards enhancing above-ground and underground biodiversity in forest and agricultural systems.

4. Cultural Landscape as the Basis for Management

The concept of *'sacred landscapes'* or *'sacred groves'* is a worldwide phenomenon. It developed from the recognition that any modification of nature should actively maintain ecosystems in a diverse and productive state, based on locally evolved TEK. In sacred landscapes, a degree of restricted land use is permitted, whereas scared groves cannot be used for secular purposes. Sacred groves and sacred landscapes were widespread not only in the tropics but also in temperate regions at one point in ecological history (Ramakrishnan et. al. 1998; Hughes 1998), indicative of the cultural linkage of local communities with their ecosystems.

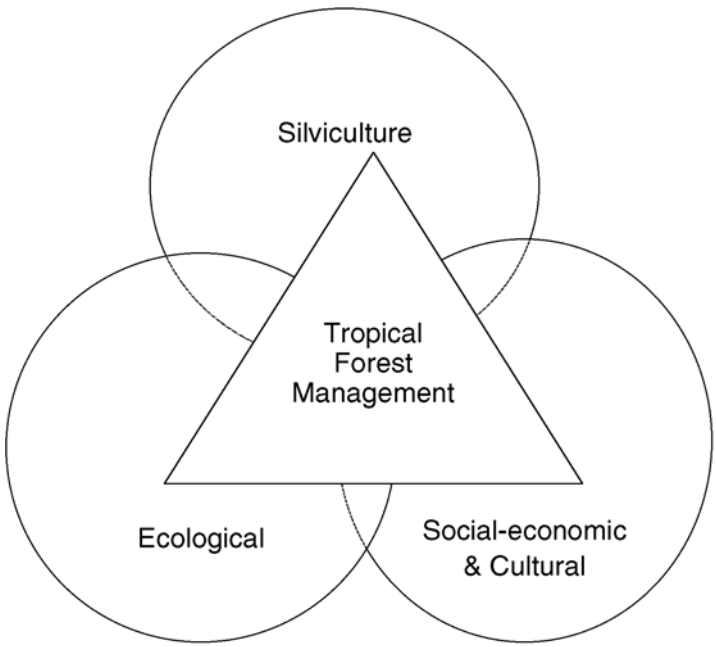


Figure 3. *Interdisciplinary interactions called for in mountain forest management and conservation (source: Ramakrishnan 1992b*

The guiding principles that regulate the use of natural resources within the landscape are embedded in the formal and informal institutions of the traditional societies. Restrictions such as on the amount harvested and times in which harvesting is allowed are determined by village committees (Ramakrishnan et. al. 1998), and need to be adapted to present-day requirements. In some sacred landscapes, such as the 'Demajong landscape' sacred to Tibetan Buddhists of the Sikkim region in the Eastern Himalayas, traditional institutional arrangements differentiate between permissible small-scale disturbance and non-permissible large-scale disturbance (Ramakrishnan et. al. 1998). When a hydroelectric project was initiated in this landscape, strong social reaction led to its abandonment.

We can learn many lessons from the integrated way in which sacred landscapes are managed by traditional institutions in the developing tropics. The more recently evolved biosphere-reserve concept of UNESCO, indeed a rediscovery of the sacred landscape of traditional societies (Ramakrishnan et. al. 2002), is an attempt to move towards an integrated management strategy in order to conserve natural resources for sustainable land use.

References

Bernbaum, E. 1997. The Spiritual and Cultural Significance of Mountains. In: B. Messerli and J. D. Ives (eds), *Mountains of the World: A Global Priority*. London and New York: The Parthenon Publishing Group, 39–60.

Chokkalingam, U., J. Smith, W. de Jong, C. Sabogal, H. Dotzauer, and H. Savenije. 2000. *Towards Sustainable Management and Development of Tropicl Secondary Forests in Asia: The Samarinda Proposal for Action.* Bogor, Indonesia: Center for International Forestry Research, 26 pp.

Hladik, C.M., A. Hladik, O. F. Linares, H. Pagezy, A. Semple, and M. Hadley. 1993. *Tropical Forests, People and Food: Biocultural Interactions and Applications to Development.* UNESCO-MAB Book Series 13. London and New York: The Parthenon Publishing Group (in association with UNESCO, Paris).

Holling, C. S., F. Berkes, and C. Folke. 1998. Science, Sustainability and Resource Management. In: *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*, edited by F. Berkes and C. Folke. Cambridge, U.K: Cambridge University Press, 342–362.

Hughes, J. D. 1998. Sacred Groves of the Ancient Mediterranean Area: Early Conservation of Biological Diversity. In: Ramakrishan, P. S., K. G. Saxena, and U. M. Chandrashekara, eds. *Conserving the Sacred for Biodiversity Management*. New Delhi: Oxford & IBH Publishing; Enfield, New Hampshire: Science Publishers Inc; in association with UNESCO, 101–121.

National Academy of Sciences. 1975. *Underexploited Tropical Plants with Promising Economic Value*. Washington, D.C.: National Academy of Sciences.

NEPED and IRRR. 1999. *Building Upon Traditional Agriculture in Nagaland*. Nagaland, India: Nagaland Environment Protection and Economic Development (NEPED); Philippines: International Institute of Rural Reconstruction (IRRR).

Patnaik, S. 2003. Sustainable Non-Timber Forest Products Management: Challenges and Opportunities. In: *Managing Traditional Ecologcial Knolwledge for Biosphere Management in South and Central Asia*, edited by P. S. Ramakrishnan, R.K. Rai, R.P.S. Katwal, and S. Mehndiratta. New Delhi: Oxford & IBH Publishing, in association with UNESCO (in press), 87–127.

Pratap, T. and H. R. Watson. 1994. *Sloping Agricultural Land Technology (SALT): A Regenerative Option for Sustainable Mountain Farming.* ICIMOD Occasional Paper no. 23. Kathmandu, Nepal: International Institute for Mountain Development.

Ramakrishnan, P. S. 1992a. *Shifting Agriculture and Sustainable Development: An Interdisciplinary Study from North-Eastern India*. UNESCO-MAB Series, Paris, Parthenon Publ., Carnforth, Lancs. U.K. 424 pp. (republished by Oxford University Press, New Delhi 1993).

———. 1992b. Tropical Forests: Exploitation, Conservation and Management. *Impact of Science on Society,* 42: 149-162.

———. 1994. The Jhum Agro ecosystem in North-Eastern India: A Case Study of the Biological Management of Soils in a Shifting Agricultural System. In *The Biological Management of Tropical Soil Fertility,* edited by P. L. Woomer and M. J. Swift. Chichester, U.K.: John Wiley and Sons, 189–207.

———. 1996. Conserving the Sacred: From Species to Landscapes. UNESCO: *Nature & Resources*, 32: 11–19.

———. 2001. *Ecology and Sustainable Development.* New Delhi: National Book Trust of India.

Ramakrishnan, P. S., J. Campbell, L. Demierre, A. Gyi, K. C. Malhotra, S. Mehndiratta, S. N. Rai, and E. M. Sashidharan. 1994. *Ecosystem Rehabilitation of the Rural Landscape in South and Central Asia: An Analysis of Issues*. UNESCO Regional Office for Science and Technology for South and Central Asia (UNESCO-ROSTCA) Special Publication. New Delhi: UNESCO-ROSTCA.

Ramakrishnan, P. S., U. M. Chandrashekara, C. Elourd, C. Z. Guilmoto, R. K. Maikhuri, K. S. Rao, S. Sankar, and K. G. Saxena. 2000. *Mountain Biodiversity, Land Use Dynamics and Traditional Ecological Knowledge*. New Delhi: Oxford & IBH Publishing, in association with UNESCO.

Ramakrishnan, P. S., A. K. Das, and K. G. Saxena. 1996. *Conserving Biodiversity for Sustainable Development*. New Delhi: Indian National Science Academy.

Ramakrishnan, P. S., R. K. Rai, R. P. S. Katwal, and S. Mehndiratta. 2002. *Managing Traditional Ecological Knowledge for Biosphere Management in South and Central Asia*. New Delhi: Oxford & IBH Publishing, in association with UNESCO.

Ramakrishnan, P. S., K. G. Saxena, and U. M. Chandrashekara, eds. 1998. *Conserving the Sacred for Biodiversity Management*. New Delhi: Oxford & IBH Publishing; Enfield, New Hampshire: Science Publishers Inc; in association with UNESCO.

Swift, M. J. and J. S Ingram. 1996. *Effects of Global Change on Multi-Species Agroecosystems: Implementation Plan*. GCTE Report No. 13. Wallingford, U.K.: Global Change and Terrestrial Ecosystems Focus Office.

Swift, M. J., J. Vandermeer, P. S. Ramakrishnan, J. M. Anderson, C. K. Ong, and B. Hawkins. 1996. Biodiversity and Agro ecosystem Function. In *Functional Roles of Biodiversity: A Global Perspective,* edited by H. A. Mooney, J. H. Cushman, E. Medina, O. E. Sala, and E-D. Schulze. SCOPE Series. Chichester, U.K: John Wiley, 261–298.

Tacio, H. D. 1993. Sloping Agricultural Land Technology (SALT): A Sustainable Agroforestry Scheme for the Uplands. *Agroforestry Systems*, 22: 145–152.

Vatsayan, K. 1993. *Prakriti*. New Delhi: Indira Gandhi National Centre for the Arts.

10. Sacred Sites of West Timor: Treasuries of Biodiversity and Cultural Heritage

by Herwasono Soedjito and Yohanes Purwanto

Abstract

Developing countries are often faced with apparently conflicting objectives for the conservation of biodiversity, the promotion of economic and social development, and the maintenance of associated cultural values. In West Timor, Indonesia, many sacred sites are being exploited for marble, despite the fact that sacred sites have significant social and cultural value among local communities. These sacred sites not only maintain biological diversity and provide goods for ritual and cultural purposes but, more importantly, they produce the water necessary to maintain the livelihoods of local people. The study of ten sacred sites in Oelolok, Insana Sub district, West Timor, revealed that 189 different plant species grow in the area. Inventories from three transects outside the sacred sites recorded only forty-six plant species, with only fifteen species found in both sacred and non-sacred sites. It is undeniable that sacred sites have an important role to play in conserving biological diversity. Water is in short supply in the West Timor region, with the study site having only 1,097 millimetres of precipitation per year. This alone is a major reason why the area needs to be protected, as almost all sacred sites have spring water. Unfortunately, the number of sacred sites in West Timor is decreasing, and they could vanish altogether if development policy continues to follow an economic-materialistic path.

Dr. Herwasono Soedjito is Programme Director of the Indonesian MAB National Committee at the Indonesian Institute of Sciences (LIPI)

Dr. Yohanes Purwanto is a researcher with the Indonesian MAB National Committee at the Indonesian Institute of Sciences (LIPI)

Introduction

Embedded in their culture, the people of Dawan in West Timor protect a special landscape area for their sacred sites. They live in the Insana district of north-central Timor (Waluyo 2003). Their sacred sites are closely related to the presence of spring water, which is the principal reason for the conservation of these mostly forested areas (Naiola 2002, Poleng 2002). Furthermore, hunting in the sacred areas provides protein, and material objects for rituals and festivities. The sacred sites also provide other resources for their living needs (Naiola 2002, Waluyo 2003).

The island of Timor is a part of the Lesser Sundas, where deciduous monsoon forest can be found in the seasonally dry areas. Generally, compared to other regions in western Indonesia, the climate of West Timor is drier with poorer soil fertility. In 1997, the population density was sixty-seven people per square kilometre, with a growth rate of 1.4 percent per year. The impact of population

pressure in addition to the relatively poor soil conditions resulted in a number of people clearing forested land for agriculture and pasture so as to increase their income. In the month of July 1999, local people, in what was supposed to be the limited forest production area, cleared 210 hectares of forest. About 182.5 hectares of protected forest was exploited for the marble industry. Furthermore, Naiola (2002) concluded that the marble industry had destroyed wildlife and affected water conservation. Many spring water sources have dried out due to the increase in deforestation. In the long run, many species of plants and animals are becoming diminished.

Deforestation is also responsible for the fragmentation of ecosystems. In some cases the existence of small sacred sites is the result of forest fragmentation, even though this phenomenon endangers the existence of plants and animals. However, the remaining sacred sites can be used as a depositary of biodiversity for a large number of species. The study of sacred sites of the Dawan people in West Timor was intended to prove that sacred sites have an important role to play in conserving biodiversity and maintaining the cultural heritage of one of the many Indonesian cultures.

Background

Indonesia is the world's largest archipelago, containing more than seventeen thousand islands extending in an east-west direction for five thousand two hundred kilometres across the Sunda and Sahul continental shelves. The archipelago exhibits rich biodiversity that is unequalled in Asia (FAO 1982–83, McNeely et al. 1990, Petocz 1989, Scott 1989). The principle islands are Sumatra, Java, Kalimantan (Borneo), Sulawesi, and West Papua (Indonesian Papua Island).

Indonesia's territory covers 7.7 million square kilometres, of which approximately 5.8 million square kilometres (75.3 percent) is comprised of marine and coastal waters. Indonesia is located between two of the Earth's biogeographic regions: Indo-Malaya and Oceania. The Indo-Malayan region to the west includes Sumatra, Kalimantan, Java, and Bali, and the Oceanic region to the east includes Sulawesi, Moluccas, the Eastern Sunda Islands, and West Papua.

The vegetation types to the east and west of the "Wallace-line" are divided by a biogeographical boundary that extends from north to south along the Sunda Shelf. The natural vegetation on the shelf itself is comprised principally of the Malesian type, dominated by the commercially important Dipterocarpaceae. Vegetation to the east has greater affinities with the Oceanic Austro-Pacific zone and is dominated by mixed tropical hardwood species. Deciduous monsoon forest occurs in seasonally dry areas, particularly in the southern and eastern islands such as the Lesser Sundas and the southern part of Papua. The "outer" islands of Sumatra, Kalimantan, Sulawesi, Moluccas, and Irian Jaya comprise approximately 10 percent of the world's tropical rainforests.

McNeely et al (1990) state that Indonesia has more tropical forest than any other single African or Asian country, and is second only to Brazil in terms of tropical forest area. Unfortunately, deforestation in Indonesia is occurring at an alarming rate. Forest cover decreased from about 193.7 million hectares in the 1950s (Hannibal 1950) to 119.7 million hectares in 1985 and to 100 million hectares in 1997 (GOI/

World Bank 2000). At present, only ninety-eight million hectares remain (FWI/GFW 2001).

Characterized by an enormously varied topography of high mountain ranges, volcanoes, alluvial plains, lakes, swamp, and shallow coastal water, Indonesia presents at least forty-seven distinct natural and man-made ecosystems (Sastrapradja et al. 1989). These ecosystem types range from the ice mountain ecosystem and alpine grassland on the high mountains in Papua (at an altitude of over five thousand metres) to variations of tropical rainforest ecosystems — from lowland to mountain landscape, shallow swamp to deep lakes, from mangroves to algae communities and coral reefs — as well as an ocean ecosystem reaching as deep as eight thousand metres below sea level (MoF/FAO 1991).

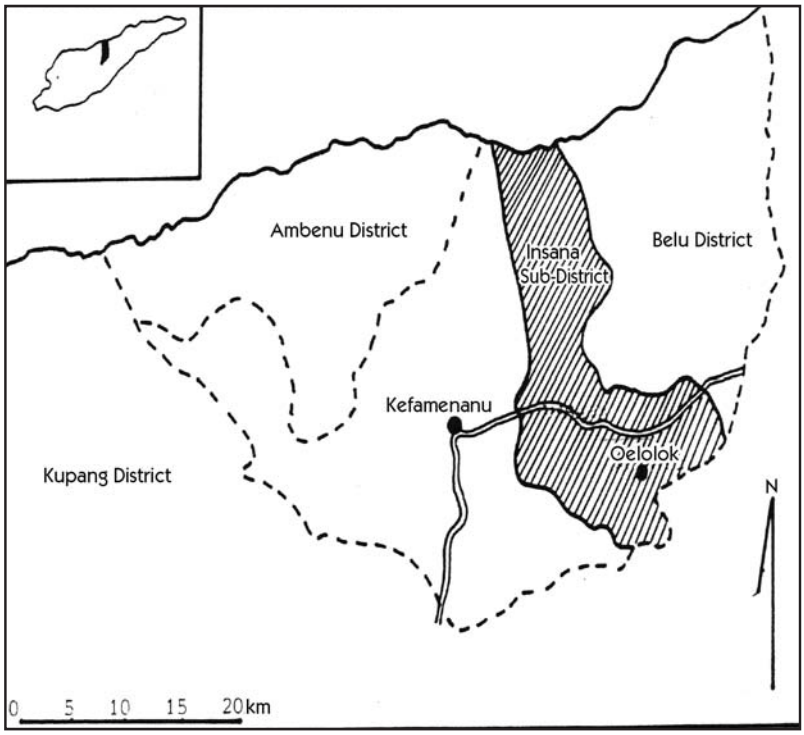


Figure 1. *The Insana and Oelolok study sites in the Belu district of West Timor, Indonesia.*

Indonesia not only has high biological diversity but also possesses high cultural diversity. Indigenous religion, as part of indigenous culture, is the product of interaction between man and the environment. High biological diversity has an important role in the socio-cultural life of Indonesian people. Some of these resources have been utilized for economic reasons, even though this national asset has not yet been fully developed.

Dynamic interaction between biological diversity and people in Indonesia led to the creation of many different cultures and thus languages and dialects. More than four hundred Indonesian ethnic groups are dispersed in different regions. Indonesia boasts 665 different languages and dialects, with West Papua accounting for 250 of these, Moluccas 133, Sulawesi 105, Kalimantan, (Indonesian Borneo) 77, Nusa Tenggara, (Lesser Sunda Islands) 53, Sumatra 38, and Java and Bali 9 (Grimes 1988). Unfortunately, little respect has been given to the high cultural diversity of the archipelago, resulting in the disappearance of many of these cultures. Studies to document and learn traditional wisdom are needed urgently, not least because traditional knowledge is often compatible with sustainable development objectives, as discussed in the World Summit on Sustainable Development, in Rio de Janeiro, 1992, and the follow-up (Rio +10) World Summit on Sustainable Development, in Johannesburg, 2002.

Study Site and Methods

The study site was situated in the Insana district of North-Central Timor (latitude 9° 02' 48" – 9° 37' 36" S and longitude 124° 04' 02" – 124° 46' 00" E), The capital city of Insana, a sub-district of Belu

district, is Oelolok, situated between 9° 30' South and 124° 45' E (Figure 1). The topography is mostly represented by hilly and mountainous landscapes and the soils are typically primarily latosols (Figure 2). The climate is extremely dry, with precipitation of 1,148 millimetres per year and a total of 72 rainy days per year (Figure 3). Average precipitation is 3.5 millimetres per month in the dry season and 215 millimetres per month during the wet season.

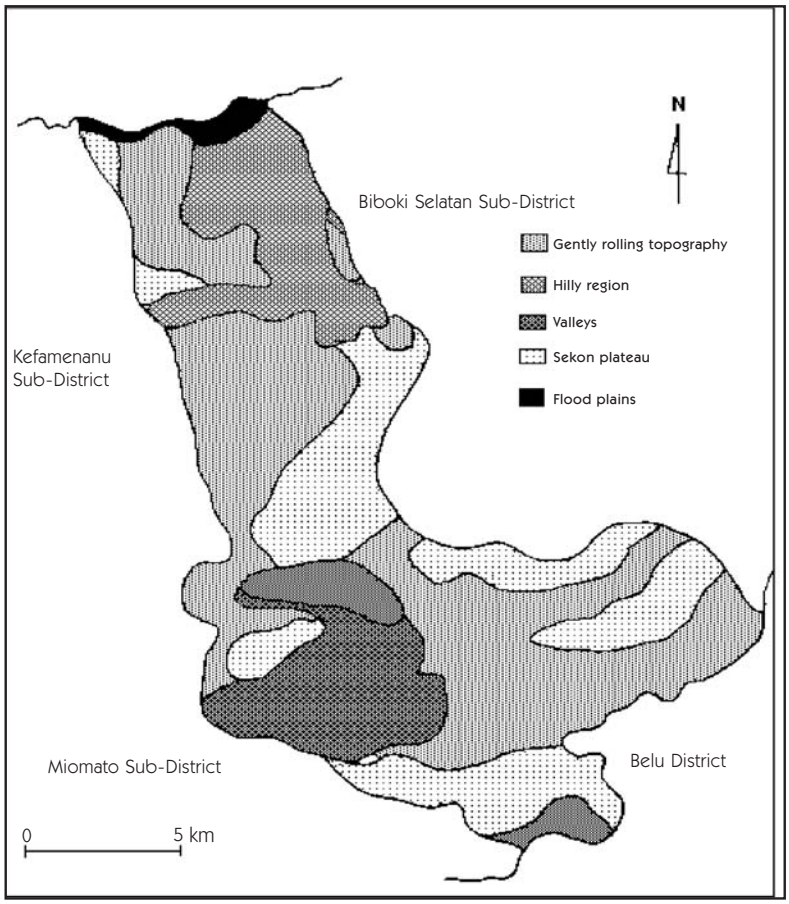


Figure 2. *Topography of the Belu district of West Timor, Indonesia.*

The Insana district is inhabited by the dawan ethnic group, where they practice swidden — slash and burn agriculture — animal husbandry, and hunting in the savannas (Waluyo 2003).

For the purposes of this study, ten sacred sites and three plots from non-sacred sites were sampled and analyzed for plant resources. Each plot measured twenty metres by one hundred metres. These plots were divided into subplots of ten metres by ten metres for tree sampling, and of five metres by five metres for saplings. Plants with a diameter greater than ten centimetres were identified as trees, while those with diameters of two to ten centimetres were considered saplings. (Measurements of the diameter of the stem or trunk were taken at fiftycentimetres above ground level.) The specimens were identified by the Herbarium Bogoriense at the Indonesian Institute of Sciences (LIPI) in Bogor, Indonesia.

Results

Despite the relatively reduced area of these sacred sites (one to two hectares), they still preserve and maintain high biodiversity. As illustrated in Table 1, many of the species found were mono species, which suggests the rarity of species belonging to the same genera. Furthermore, Naiola (2002) reported identifying eleven species of traditional medicinal plants, belonging to eight genera and eight families with various roles and functions, in a *Fatu*, a sacred geological structure. This is in stark contrast to the results of Siagian (2000) in the village of Oinbit in the same sub-district of Insana. It can therefore be said that sacred sites are the last resort for many already endangered species in Timor.

Analysis of similarity indices reveals the local specificity of species distribution in sacred site. Table 2 demonstrates that the similarity index (IS) between sacred sites and non-sacred sites was less than 50 percent, whereas for K and L, both non-sacred sites, the similarity index 57.1. Site D (Simulu) was markedly different (IS = 0) from all of the non-sacred sites (K, L, M). Similarly, SitesI

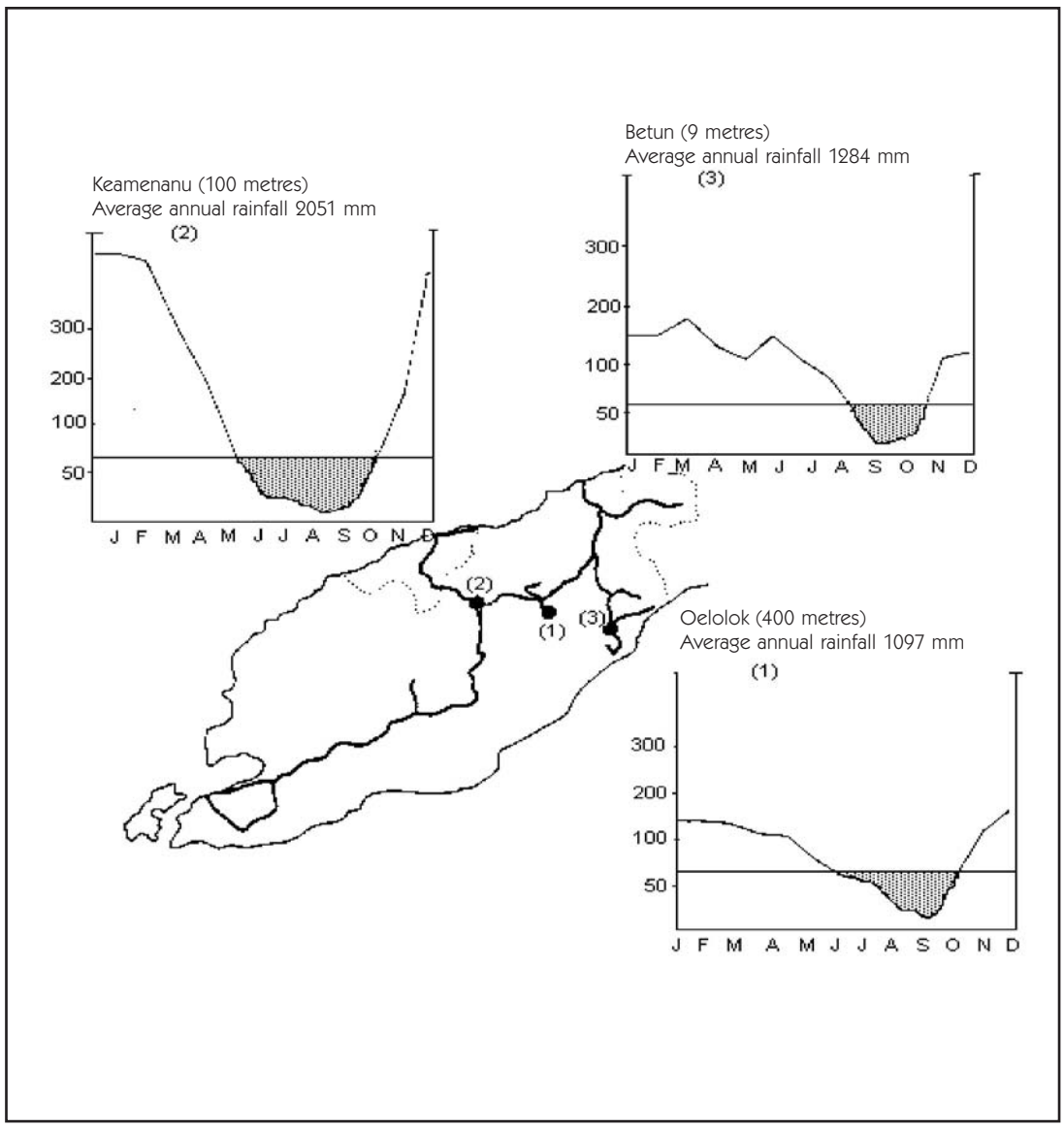


Figure 3.
Rainfall averages in the study sites and surrounding areas.

(Webot) was markedly different from Sites L and M. In the sacred site category, the highest similarity index was between A (Wemean) and E (Laran Tetun), followed by I (Webot) and J (Takirin), with an IS of 34.8, and A (Wemean) and C (G. Mandeu), with an IS of 30.8.

Table 1. *Number of species found in different sites of the sacred and non-sacred forest in West Timor Indonesia.*

Code	Name	Species	Genera
A (sacred)	Wemean	22	21
B (sacred)	Alkani	39	32
C (sacred)	G. Mandeu	30	27
D (sacred)	Simulu	24	22
E (sacred)	Laran Tetun	26	21
F (sacred)	Nualain	21	15
G (sacred)	Raihuli	47	44
H (sacred)	Lahurus	26	23
I (sacred)	Webot	31	28
J (sacred)	Takirin	38	33
K (non-sacred)		30	30
L (non-sacred)		26	26
M (non-sacred)		17	16
Insana Forest	Protected forest	57	51

The high degree of endemic species found in these small sacred areas reveals the importance of relic species and their contribution to the conservation of West Timor's sacred sites, which should be legally protected by the government. In addition to their biodiversity conservation value, sacred sites should also be preserved for their cultural values. In fact, forests, *Fatus*, and other geographical formations such as limestone outcrops, small natural ponds and associated unique biota, caves, and other particular landscapes, have been protected from degradation and destruction because of the traditional knowledge associated with them. The Dawan people believe that their Ancestors or God created all *Fatus* to provide water for them. Water is central to their culture, with many ceremonies drawn from it.

SITE	A	B	C	D	E	F	G	H	I	J	K	L	M
A		26.2	30.8	4.3	37.5	9.3	2.9	29.2	26.4	26.7	19.2	4.2	5.1
B	8		14.5	9.5	18.5	6.7	4.6	30.8	20.0	29.5	2.9	3.1	3.6
C	8	5		7.4	28.6	11.8	2.6	28.6	29.5	26.5	3.3	7.1	4.3
D	1	3	2		8.0	13.3	5.6	4.0	10.9	3.2	0	0	0
E	9	6	8	2		4.2	5.5	15.4	17.5	18.75	3.6	3.8	4.6
F	2	2	3	3	1		2.9	4.3	7.7	3.4	11.8	4.3	0
G	1	2	1	2	2	1		2.7	2.6	0	2.6	5.5	3.1
H	7	10	8	1	4	1	1		28.1	34.4	3.6	3.8	0
I	7	6	9	3	5	2	1	8		34.8	3.3	0	0
J	8	9	9	1	6	1	0	11	12		2.9	3.2	3.6
K	5	1	1	0	1	3	1	1	1	1		57.1	34.0
L	1	1	2	0	1	1	2	1	0	1	16		46.5
M	1	1	1	0	1	0	1	0	0	1	8	10	

Table 2.
The similarity index of species found in sacred and non-sacred sites in West Timor, Indonesia.

The preservation of sacred sites should also be regarded as a means to conserve the habitat of the various species they contain and to conserve genetic resources, as well as contributing to the restoration of the local climate. The situation in West Timor is such that this issue is difficult to resolve, because of the great number of potential edible fruits, vegetables, and wild animals, as well as medicinal plants and building materials that such sites often contain (Bakels and Persoon 1998). However, economic development, political change, and a more autonomous policy has the effect of accelerating deforestation and the consequent destruction of sacred sites. The on-going over-exploitation of sandalwood, the principal forest product of West Timor, contributes to this destruction. The conversion of forest land to mono-species plantations and the expansion of the

cement and marble industry are major factors in the destruction of forest ecosystems. This misuse of district policy not only has an impact on the deterioration of sacred sites but also holds back natural regeneration.

Furthermore, the effect of modernization and the influence of new beliefs have changed traditional culture. As Boedhihartono (1998) points out, the introduction of Middle-Eastern and Mediterranean religions, as well as hard-line governmental ideals of modernization, have been responsible for the lifestyle transformation of many indigenous people in West Timor, not to mention in Indonesia.

Saving these sacred sites requires not only the support and goodwill of the Indonesian central government but, perhaps more importantly, support at the district level — as Indonesian reforms have in many ways moved from a centralized towards a decentralized and autonomous (at the district level) system. A call for assistance from international institutions such as UNESCO's Man and the Biosphere (MAB) programme is also much needed.

References

Bakels, J. and G. A. Persoon. 1998. Ecology and Symbolism: the Sacred Forest of the Baduy (West Java, Indonesia). Paper presented at symposium, Natural Sacred Sites: Cultural Diversity and Biological Diversity, Paris, September 1998. Symposium organized by UNESCO, CNRS (*Centre National de la Recherche Scientifique* — National Centre for Scientific Research, France) and MNHN (*Muséum National d'Histoire Naturelle* — National Museum of Natural History, France).

Boedhihartono, A. K. 1998. Indigenous Religion, Sacred Sites and Biological Diversity. Paper presented at symposium, Natural Sacred Sites: Cultural Diversity and Biological Diversity, Paris, September 1998. Symposium organized by UNESCO, CNRS and MNHN.

FAO. 1982–83. *A National Conservation Plan for Indonesia.* (8 Volumes). UNDP/FAO National Parks Development Project INS/78/061. Bogor: FAO.

FWI/GFW. 2001. *The State of the Forest: Indonesia*. Bogor, Indonesia: Forest Watch Indonesia; and Washington D.C.: Global Forest Watch.

Grimes, Barbara F., ed. 1988. *Ethnologue: Languages of the World, 11th ed.* Dallas: Summer Institute of Linguistics.

Hannibal, L. W. 1950. Vegetation Map of Indonesia. Jakarta: Planning Department, Forest Service. Reprinted in *Forest Policies in Indonesia. The Sustainable Development of Forest Lands,* Vol 3 (30 November 1985). Jakarta: International Institute for Environment and Development & Government of Indonesia.

McNeely, J. A., K. R. Miller, W. V. Reid, R. A. Mittermeier, and T.B. Werner. 1990. *Conserving The World's Biological Diversity*. Gland, Switzerland and Washington, D.C.: IUCN.

Ministry of Forestry, Government of Indonesia, and Food and Agriculture Organization (MoF/FAO). 1991. *Indonesian Tropical Forestry Action Programme, Country Brief*, (three volumes). Jakarta: MOF/FAO.

Ministry of Forestry, Government of Indonesia, and World Bank (MoF/GOI and World Bank). 2000. *Digital Dataset on CD-ROM*. Jakarta: Indonesia.

Naiola, B. P. 2002. "Fatu" Sebagai Sumber dan Habitat Konservasi Biodiversitas Tumbuhan Obat Tradisional di Pilau Timor ("Fatu" as a Habitat for the Conservation of Traditional Medicinal Plant Diversity on Timor Island). In *Prosiding Simposium Nasional II Tumbuhan Obat dan Aromatik* Bogor. Indonesia: Kehati (Indonesian Biodiversity Foundation); LIPA (*Lembaga Ilmu Pengetahuan Indonesia*, Indonesian Institute of Sciences); APINMAP (Newsletter of the Asian Pacific Information Network on Medicinal and Aromatic Plants); UNESCO; and JICA (Japan International Cooperation Agency), 488–491.

Petocz, R. G. 1989. *Conservation and Development in Irian Jaya: A Strategy for Rational Resource Utilization*. Leiden, Netherlands: E. J. Brill.

Sastrapradja, D. S., S. Adisoemarto, K. Kartawinata, S. Sastrapradja, and M. Rifai. 1989. *Keanekaragaman Hayati Untuk Kelangsungan Hidup Bangsa* (Biological Diversity for the Sustainable Life of a Nation). Bogor, Indonesia: Pusat Penelitian dan Pengembangan Bioteknologi; LIPI.

Scott, D. A., ed. 1989. *A Directory of Asian Wetlands*. Gland, Switzerland and Cambridge, United Kingdom: IUCN.

Siagian, M. H. 2000. *Jenis-jenis Tumbuhan yang digunakan Sebagai bahan Obat Tradisional oleh Suku Dawan di Desa Oinbit, Kec. Insana, TTU, NTT* (Plant Species Used as Medicinal Material by the Dawan People in Oinbit Village, Insana Sub-District). Laporan Teknik Proyek Penelitian Pengembangan dan Pendayagunaan Potensi Wilayah. Puslitbang Biologi-LIPI.

Waluyo, E. B. 2003. The Spatial Environmental Organization and the Life of Dawan People in Timor, Indonesia. *Journal of Tropical Ethnobiology* 1 (1): 31–39.

11. Japan's Sacred Mountains

by Kunio Iwatsuki

Introduction

The Japanese Archipelago is geomorphologically complex, with hills, valleys, high mountains, and small areas of plains and basins. Due to the varied topography and humid warm climate, influenced by the Black Current, the archipelago is covered with lush vegetation and is inhabited by a rich diversity of organisms. Japanese people have appreciated this biodiversity throughout its history, although today we are faced with a crisis brought on by recent change in lifestyles and value system. A recent report by the Committee of the Science Council of Japan summarized the value system and lifestyle issue (the English version of this report is accessible on the Kosmos Web Forum at http://www.kosmosweb-forum.org).

Professor Kunio Iwatsuki is Chairperson of the UNESCO-MAB Japanese Committee and a professor at the University of the Air in Tokyo

Our folklore leads us to believe that there are eight million gods represented in nature. This is a substantial number and is actually representative of the fact that everything in nature is respected as "god". Japanese people were taught to respect nature — our ancestors were always grateful for natural products. For instance, it is well known in our custom that during meal times thanks are to be given to god both at the beginning and end of the meal, although this custom is not always accepted by the younger generation.

The Japanese have a lot of respect for Mount Fuji, the highest mountain in Japan. Mount Fuji is a veritable symbol of the beautiful mountain landscape, so much so that there are many local "Fujis" in various sites that are representative of this beauty and for the most part are sacred mountains. Every mountain is considered to be a place of god. In this sense, the notion of "god" is markedly different to the gods of various established religious sects. These religious groups and sects occasionally adopt folklore into their belief system.

Sacred Mountains in Japan and Biodiversity Conservation

The traditional ideal of Japanese people follows the core principle of harmonious co-existence between man and nature, even though it was not recognized on a theoretical base. The Japanese lifestyle developed *Satoyama* in which the recycling of natural products was encouraged. *Satoyama* has two characters; one depicts the countryside or village and the other depicts the mountain. The geo-

morphological structure of the Japanese Archipelago means that valleys and basins are developed for agriculture, notably for paddy fields, while mountains, next to which villages are located, used to provide various natural products such as wood, vegetables, mushrooms, fuel, and so on. The population determined their own rules regarding the use of natural products, which were utilized in a sustainable way.

This lifestyle had been maintained since the New Stone Age until the time of the Meiji Restoration: westernized culture has dominated in Japan ever since. During that time, 20 percent of the surface area of Japan was developed for agricultural purposes, with 80 percent maintained as a green belt, although secondary or artificial forests covered almost the entire area. It is regrettable to note that recent development of modern technology in Japan has destroyed the *Satoyama* system, which has lead not only to the degradation of nature but also to the abandonment of folk belief. However, there has been a recent movement towards conserving a lifestyle practiced in *Satoyama*, which recalls our ancestor's idea of worshipping nature. *Satoyama* is still preserved in certain regions, where it is maintained only in order to defend this unique "historical" lifestyle. Modern Japanese show preference towards a more comfortable life, although people in certain regions continue the recycling of natural products.

A Natural Strategy for Biodiversity and Sacred Mountains

Despite the fact that many US scientists are contributors to the Convention on Biological Diversity (CBD), the USA has yet to sign the convention. Japan set up its first National Strategy in 1996, which was completely revised in 2002, and demonstrates the Japanese government's resolve and commitment to biodiversity sustainability. The traditional lifestyle of *Satoyama* is repeatedly referred to as a model of biodiversity conservation, and this is supported theoretically by traditional Japanese in their respect for the eight million gods (despite the fact that the Japanese are often not considered religious). This religious concept is quite different from the West, where only one god is worshipped.

Furthermore, many sites, once respected by our ancestors, are being reconsidered as sacred mountain sites. The Yoshino-Kumano sacred mountain area is currently being proposed as a World Heritage Site and is on the nomination list. Among the four biosphere reserves in Japan, Oodai-Oomine mountain range is considered a sacred area; it is also the teaching site for a specific Buddhism sect. Other World Heritage and Biosphere Reserve nominations are under preparation. Conservation and scientific monitoring of these areas are now being promoted and we are expecting to obtain results in the very near future. It is hoped that the sacred mountain status will draw people to explore environmental issues.

12. Mongolian Sacred Sites and Biodiversity Conservation

by Norov Urtnasan

1. Mongolia's Natural biodiversity

Dr. Norov Urtnasan is Secretary General of the Mongolian National Commission for UNESCO and Chairperson of the Mongolian National Committee for World Heritage

Mongolia is a landlocked country spanning a vast 1.56 million square kilometres on the southernmost fringe of the Great Siberian boreal forest and across the northernmost Central Asian deserts and steppes. Mongolia borders the Russian Federation in the north and the People's Republic of China in the east. Approximately 80 percent of Mongolian territory is situated at an altitude greater than 1,000 metres, with an average altitude of 1,580 metres. One-third of the territory consists of desert and desert steppe zones. The northern part of the country is covered by forest mountain ranges, dominated by Siberian larch and pine; the southern part encompasses desert, desert-steppe areas with low mountains, rolling hills; the western part is made up of snow-capped high mountains and the eastern part includes of an area of vast plains and wild heaths. This portrait demonstrates the great contrast and diversity of the Mongolian landscape.

2. Conservation and Protection

The Mongolian Parliament has passed, and has begun to reinforce, over twenty laws to reflect state policy on nature conservation. Mongolia was the thirtieth country to ratify the Convention on Biological Diversity (CBD), in 1993, and has since employed considerable effort to implement the Convention, including the National Biodiversity Action Plan.

The Mongolian government recently reprinted the Mongolian Red Book, which firmly supports the protection of biodiversity. The "Mongolian Trust Fund" has been established with the aim of providing long-term financing for nature conservation, the sustainable use of natural resources, and the restoration of the environment. Mongolia has been actively participating in multi-lateral meetings on the Convention on Biological Diversity and other similar activities. The first national report for the CBD, "Biological Diversity in Mongolia", has been completed.

In addition to legal (normative) regulations, national traditions play an important role in nature conservation. Since ancient times, the state of Mongolia has conducted a policy aimed at nature conservation and the proper use of natural resources, which has been passed down to younger generations, and today has become more wide-ranging, with the introduction of new concepts.

2.1 Mongolian Traditions of Worshiping and Protecting Nature

The Great Steppes of Central Asia and the wide expanse of land which makes up the territories of Mongolia today represent the cradle of nomadic civilization. This cultural overlap evolved into classical traditions, which make up the rich historical and cultural heritage left by our ancestors. The principle ethos of the nomadic lifestyle involves the interactions between animals, humans, and nature (or land, water, and sky). Mongolian people have shared unique traditions, closely associated with nature, through their definition of nature, the earth, and water, and through worshiping and glorifying their homeland, the flora, fauna, mountains, hills, rivers, and lakes, for many generations. This vision is connected with Mongolia's nature, climate, and nomadic civilization and cultures. Mongols depend on nature. Their everyday life has always revolved around a close relationship with their environment. The human-environment interaction was a deep-rooted part of Ancient Mongol beliefs, particularly in totemism. Shamanism, which followed on from totemism, embodied father-heaven and mother-earth worship. The Buddhist religion, while replacing Shamanism, adopted many of the beliefs and traditions of Shamanism, and includes Mongol canons in its teachings and religious texts — the sutras. Mongolians have numerous traditions that venerate and protect nature and the environment, such as their worship for:

- *Land, (mountains, hills, ovoos, rocks)*
- *Water resources (rivers, lakes, springs, waterfalls)*
- *Trees and plants, forests, groves*

According to estimates by the prominent Mongolian scholar, O. Sukhbaatar, there are some eight hundred sacred sites and venerated mountains in Mongolia.

3. Classification of Sacred Mountains and Sites in Mongolia

Sacred mountains and sacred sites are encountered everywhere in Mongolia. These sacred sites have witnessed venerable state, civic, and religious ceremonies in which the whole nation participates.

Sacred sites can be divided into the following categories, depending on the worshipper. Mountains can be worshipped by the whole nation or only in certain areas by certain tribes and by certain families for many generations. Let's take one example. There are about twenty sacred mountains and *ovoos* (sacred stone cairns) in Myangad Soum in Hovd province: Khokhiin Ovoo, Zeeregiin Ovoo, Taliin Ovoo, Bayangoliin Ovoo and Halzan Hairkhanii Ovoo were worshipped by the entire population living in the area, and the Ovoo Naadam (national festival) was celebrated by all with a horse race, wrestling, and archery in the valley. But the different Myangad tribes also worshipped their individual *ovoos*: the Khokhnuud worshipped Tsakhriin Ovoo; the Ogtoruud, Tsutgalangiin Ovoo; the Boshigo Nar, Bayan Ovoo; the Arvan Takhia Nar, Burged Ovoo; the Dochinn Dorviinkhon, Tunge-Dansrangiin Ovoo, and the Gazarchiinkhan worshipped Suvagt Ovoo.

Mountains and *ovoos* worshipped by families have often been worshipped by the same family over many generations, and are usually situated near their winter and/or spring settlements. According to each family tradition, family members, and sometimes their neighbours, go to the worshipped mountains or *ovoo* on the first day of the new year (Tsagaan Sar), so as to offer the best of their food and dairy products in honour of the land and the water, mountains and *ovoos*, and in doing so wish for themselves prosperity, luck, and a fine and healthy life.

Sacred mountains and waters, as well as other sacred sites, are considered natural sites of that area. Nobody disrupts sacred places; one stops by them, offers the best of his or her food, and prays for them. If visitors do not have any food with them, they have to add a stone to the *ovoo*. Altai Khangai, Khan Khentii, Bogd Khan, and Otgontenger mountains are examples of the largest sacred mountains worshipped by the government and the nation.

4. Identification of Sacred Sites in Mongolia

In the recommendations of the UNESCO thematic expert meeting on Asia-Pacific mountains held in Japan in September 2001, it was noted that the process of identifying sacred sites and their specific characteristics is complex, as they often comprise both natural and cultural heritage values that are difficult to quantify. However, some indicators or characteristics are defined: the highest spot at a sacred site is often considered to be at the centre of the cosmos or the world, thus representing power, and is home of a deity or deities; sacred sites may be part of the identity of a nation or group of people; sacred sites are often places of worship and of sacred rituals and practices; they are often considered the place of residence of spirits or ancestors; they are known as a place of inspiration or transformation; or they are a place of pilgrimage.

Our intention is to identify Mongolian sacred sites in accordance with some of these characteristics.

4.1 Height

Most of the sacred sites in Mongolia are sacred mountains. Mongolian people consider elevated land in any region of the great Mongolian steppes to be a mountain or a high hill.

Mongolians single out certain peaks of the Altai, Khangai, and Khentii Mountain ranges as being sacred sites: the snow-capped peak, Otgontenger, of the Khangai range; the five peaks of the Altai Mountain range; and the Burkhan Khaldun and Bogd Khan remote peaks of the Khentii Mountain range. These mountains — the ones traditionally termed as "sacred" — have well-established systems of myths, beliefs, legends, and rituals and religious practices of worshiping mountains. They also contain sacred sites and objects such as temples, monasteries, stupas, stones, springs, and especially *ovoos* (stone cairns). Every venerated mountain or hill in Mongolia has an *ovoo* built on the top of it. *Ovoos* are also found at the source of rivers and springs. Essentially, they are seen as being connected to the mountain.

4.2 Deities, Gods, Powers, and Spirits of the Sacred Mountains

Mongolian people believe that each mountain, stream, river, spring, and lake has its own deity. This is illustrated by the proverb "A mountain has a deity and water has a spirit". Each river, mountain, hill and lake that make up a homeland has a deity. This belief was adopted by Buddhism and later became an inseparable part of the religion and of people's lives. People were buried at high altitudes so as to entrust them to the deity. Creating *ovoos* on the tops of mountains and hills and at the juncture of roads is intended to serve as many deities as possible. Thus the settings of *ovoos* is not entrusted to chance, but are instead points of influence within the landscape, in both a physical and a spiritual sense.

Deities of sacred sites and mountains are described in ritual sutras and in oral and written literature, stories, and legends. Deities can be gods or goddesses; some mountain deities are represented by a military commander or hero. The usual deities of rivers, lakes, and waters are goblins, such as Savdag, Navdag, and Yulha. Many mountains have ferocious deities. The deity of Mt. Otgontenger is Ochirvaani; Dunjingarav is the deity of Mt. Bogd Khan, and Gombo possesses Sant Khairkhan in Bulgan Aimak. Many mountains are possessed by Dalkh, Lhachin-Bandad and Govyn Lkha. All of these gods are very ferocious; they emerged after Buddhism was introduced in Mongolia.

The ancestral spirit can communicate directly with the gods or deities of heaven and earth. Since ancient times, Mongolians have entrusted their lives to the hills that possessed the great power of the gods and ancestors. They make offerings and pray to them in order to be granted a long life, prosperity, well being, and happiness. They also pray to avoid natural disasters and catastrophes such as drought, heavy snow, hail, windstorms, diseases, and sin. The main purpose of worshipping mountains is to please the possessor and deity of the land and ask for blessing and benediction for the well being of families and livestock in the province.

Through this veneration, equilibrium between humanity and nature has been maintained for centuries.

4.3 Rituals and Practices of Worshipping Sacred Sites and Reciting Sutras

These rituals and practices of worshiping sacred sites in Mongolia are closely connected with the nomadic cultures of the Central Asian region. These traditions and rituals originated with Shamanism and were enhanced and often modified and codified by Buddhism. They are now widely practiced throughout Mongolia.

The focus of these rituals and practices are *ovoos,* each of which is considered the home of an ancestral spirit. A wooden stick with *Kadakhs* tied around it (long, narrow bands of silk presented to someone or something as the symbol of the god) is placed on the top of the *ovoo*. Four stones are put on four sides of the *ovoo* to burn incense on. The most important guest is seated at the northwest side of the *ovoo*. Then a fire is lit near the *ovoo* and people participating in a ceremony offer meat, diary products, vodka, and *airag* (fermented mare's milk) to the *ovoo*. The incense is burnt, and then a sutra specific to the mountain is recited.

The traditions of venerating mountains has arisen from both oral (shamanic) and written sources. With the coming of Buddhism and the emergence of written texts, Mongolian people created written teaching books (sutras) to recite to venerate sacred mountains and *ovoos*. Mountain sutras are not only religious books for rituals ceremonies; they are also an invaluable repository of wisdom derived from Mongolian culture and its tradition of worship. Some sutras are especially written for certain mountains.

Over 280 sacred sites have their own holy Buddhist texts (sutras). An example is the Tsorj Agvaandorj sutra, written in Mongolian, which makes reference to mountain-worshipping rituals:

- *The invitation to gods of land and water is expressed in the following phrase: "We are inviting the caring heaven, the gods of land and waters, the gods of eight directions and the earth, who take care of all living beings residing in mountains, trees stones, cliffs, waters, grasslands, marsh, feather grass, and mountain passes".*
- *The bestowing of offerings of Mongolian food and dairy products for the gods and water is expressed in the following phrase: "We are offering you the best of our holy milk and tea, vodka and* airak *(fermented mare's milk), yogurt, curds and cream, delicious fruit and meat, flour, and butter".*
- *The repentance of someone's sins and mistakes is expressed as the following: "We are repenting our sins and mistakes; of making burning smell and dirt, killing creatures, digging the land and waters, cutting trees, removing stones, killing animals, settling in sacred places, and other sins that were not repented at the appropriate times".*
- *We also worship and pray to mountains and waters for having no severe rains, snowstorms, storms, drought, fire, earthquake and other natural disasters.*

After receiving each of these sutras, lamas or monks preach. Every participant of the ceremony shares the food and offerings, and then they cross to the valley, where a *naadam* (national festival) takes place. Despite the fact that the mountain worshipping ceremony ceased during certain periods for political and/or social reasons, the ritual has been preserved from generation to generation for hundreds of years, and it has been restored in recent years.

5. Value and Importance of Sacred Natural Sites in Biodiversity Conservation

The value and importance of sacred mountains for biodiversity conservation are apparent in the following aspects:

- *These sacred mountains have kept their pristine nature and natural biodiversity for hundreds of years.*
- *They are the heritage bestowed for present and future generations as a legacy of the national traditions, customs, sutras, chronicles, history, culture, and science passed on from the ancestors.*
- *They ratify peoples' belief in maintaining the equilibrium between ecology and nature protection.*
- *The importance of sacred mountains lies in that they not only benefit the ecology of a particular country but of the whole world.*

Scientists and researchers have developed various hypotheses to explain the existence of customs and religious traditions that protect nature and have a great importance for biodiversity conservation in Mongolia. A leading specialist, Dr O. Amarkhuu, defines five spheres of "tradition" in relation to nature, and especially within sacred sites: benevolence and respect; taboo and prohibition; education and teaching; religious beliefs and worshipping; and observation and cognition. We will explore examples of each of these hypotheses:

5.1 Benevolence and Respect

The tradition of benevolence and respect teaches Mongols from an early age to protect natural and animal resources, and to use them wisely to meet basic living standards. The following customs describe the benevolent and respectful attitude towards nature and sacred sites:

- *Morning begins early with the women preparing and offering tea and milk to the sacred mountain and ovoos. This becomes more meaningful and ceremonial during the lunar New Year. Other customs related to the traditional lifestyle of nomadic Mongols include the starting dates for milking mares, the castration of livestock, wedding, childbirth, etc.*
- *One of the most significant customs, which was commonly practiced and has more recently become a sort of state ceremony, is the cult of the mountains and hills. This is an important and widely practiced custom for Mongols.*
- *When worshipping the soil and water, Mongols address the sacred places using respectful titles such as The Lord Mountain, The Queen Mother, The Milk of My Beloved Mother, the Bogd Khan, Khanjargalant (King's happiness), Queen Tuul, Golden Mountain etc. Some mountains, lakes, and rivers have even been awarded state ranks and decorations. The Orkhon River still enjoys the title of Tushee Gun. The Mongol custom is to not pronounce the names of the sacred place situated nearby, and to always replace the name by other respectful words such as "High Mountain".*
- *The residents of the Gobi region worship and give praise to tamarisk trees (Halaxylon ammodendron). People in the Khangai region praise birch, Cornelian cherry, juniper, and other bushes. It is also common practice for Mongols to praise single or peculiar trees. Single or peculiar trees were called Udgan Mod, meaning sacred, and people praised them by placing Khadak and offerings at their base. It was taboo to chop them down, and in some places even to approach these trees.*
- *The birch tree was considered to be faithful to man and livestock because it was commonly used as poles for* gers *(yurt), saddles, loops etc. Cornelian cherry was used for its scent, and its roots were used for milk and* airag *(fermented mare's milk) scoops, ceremonial spoons, sweat scrapers for horses etc.*
- *Mongols always paid homage to clean water and springs, which is why water was symbolically called the "Wish–granting jewel", and rivers, lakes, ponds, and springs were protected.*
- *Mongols hunted animals only during certain seasons, avoiding the reproductive season and taking into account the best time to use the skin and meat. All products, skin and meat, were purposefully and rationally consumed. Hunters uphold a tradition of not killing elks during the mating season; young calves, pregnant animals, or those with calves during hibernation or gatherings (like a snake forum); the leader in the herd; or unique individuals.*

5.2 Taboo and Prohibition

Taboo and prohibition were the means to enforce the canons of the benevolent and to encourage a respectful attitude towards nature at the sacred sites. The younger generation is thus taught to respect the restrictions linked to nature, which helps in their overall comprehension of the reproductive capacity of nature. The following customs describe the essence of taboo and prohibition traditions:

- *Special places found in a pristine natural state and rare animals and plants were labelled "vicious place". It was strictly prohibited to alter the land, chop trees or plants, or hunt in these places. People believed from their childhood that violation of these rules would make the Lord of Land and Water furious — bringing misfortune, disease and bad luck to all.*
- *During annual reproductive seasons, in the spring and summer months, it was prohibited to dig for soil or to collect seeds, berries, wild onions, and other plants. People believed that these actions would affect the drainage of water into the rivers. It was also taboo to slaughter animals near a river or to pour blood into it.*
- *It was prohibited to leave ashes or any kind of waste at the sacred sites, or to build houses or gars at sources of rivers and springs.*
- *Mongols considered birds as "animals of the sky", and educate children to protect them, to not destroy nests nor kill the young. They considered birds to be very sensitive creatures, and people would not even approach their nests or allow their shadow to fall on the nest.*
- *It was taboo for Mongols to kill snakes, not only because of their longevity but because snakes are respected for their unique abilities and their role in nature.*

Researchers agree that the ultimate purpose of the taboo and prohibition tradition was to instil the culture of nature protection to individuals, which later developed throughout the country.

5.3 Education and Teaching

Mongol traditions of education and teaching were based on understanding nature and having a thrifty attitude towards it. Parents taught their children, brothers and sisters taught younger siblings, elders taught the subsequent generation that following the rules and taboos will bring good and violations will lead to misfortune.

Education and teaching traditions can be described by the following examples:

- *Mongols considered the earth as a human being and taught children not to hurt the arteries of the earth.*
- *Children were taught that if they cut growing green trees, the trees would cry with milky tears and cause a reduction of milk products for mankind*
- *Mongols used to select open, dry rocky areas to make fires in the forests. They also offered prayers so as to not cause forest fires and they carefully put fires out on leaving.*
- *One of the important means of transferring canons to the people was through folklore, (fairytales, legends, songs, hymns, prayers, proverbs, and common sayings) as well as through national games.*

5.4 Religious Beliefs and Worshipping

In relation to the protection of nature, Mongol religious beliefs have very close connections with ancient customs; their expression can be found in Buddhist teachings and culture:

- *In their struggle for survival the ancient Mongols used to note unusual natural phenomena that acted favourably for them, and they later began to worship them. Ancient Mongols idolized trees, stones, the sun and the moon. This form of worship of natural phenomena, separating them from common activities, is nowadays known as fetishism — it is widespread and has found its continuation in religious traditions. Also, people going abroad took a stone with them as a souvenir of their native land.*
- *Considering everything surrounding them to be alive, people believed that by speaking to nature they could influence fate, luck, and fortune.*
- *Though Mongols protected all animals, they had special ceremonies for hunting wolf, elk, bear, and white hawk. Wolf and elk are related to totemism; the bear is considered the Lord of the Forests and the white hawk was the symbol of the Borjigin clan of Esukhei, the father of Chingis Khan (Genghis Khan). Bears, as Lords of the Forests, were never hunted simply for fun. Bear hunters used to recite special prayers, such as; "Forgive me, Lord, it was not my intention to kill you, a stray bullet hit you" or while flaying; "My body is freezing, please give me your heat". Hunters used to fasten the head of the bear to the toono (cupola) of the* ger *and make offerings to it. Fish were protected by Mongols and placed as a symbol in the middle of the state emblem, Soyombo. Until recently, Mongols disapproved of fishing. Fish were seen as vigilant animals that never close their eyes and have a unique ability to reproduce rapidly; this is why a crossed fish symbol can be seen on earrings worn by women.*
- *Worshipping soil and water also originated from totemism. Even people who consider themselves atheists find peace and tranquillity in visiting the places where they were born, or in drinking from water sources from their childhood.*

5.5 Observation and Cognition

Traditions of observation and cognition are based not only on *zurkhai*, a special way of telling and predicting things using mathematical, astrological, astronomical, and other calculations, but on the experience and observation of people in relation to changes in nature, natural phenomena, and the ability to conduct their lives in harmony with nature.

6. State-Decreed Sacred Sites in Mongolia

6.1 State Sacred Mountains

Khan Khentii, Otgontenger, and Bogd Khan Khaurkhan are three state-worshipped mountains in Mongolia. Worshipping at these mountains began during Khunnu times by the first governing state of Mongolia, and this tradition continues to the present day. Chingis Khan (Genghis Khan) first identified these sites as sacred mountains in the thirteenth century, and they were worshipped by his empire. Khentii Khan is the birthplace of Chingis Khan.

In the official document of the Ministry of Internal Affairs sent to provinces in 1294 — on the fifteenth day of the first month in the first year of Ulziit Khan — it was stated that Bogd Khaan mountain, Khentii Khan mountain, Otgontenger mountain, Altai mountain, Khitan mountain, and other beautiful areas were natural reserves. The law, called "Khalkh Juram" and approved in 1709, proclaimed Khentii Khan and Bogd Khan as mountain reserves. Later, in 1778, as a result of King Uyndendorj's efforts, Bogd Khan, Khan Khentii, and Otgontenger mountains were also officially declared mountain reserves, and the decision was made to worship them every year. The Mongolian Legal Document was established according to official decree, legally declaring the ceremony of worship for these three mountains. The statement was expressed in the following words: "Old regulations from all provinces should be followed when celebrating a worship ceremony of the heaven, the land, old temples, the god of land, the god of plantation". In addition, issues related to ceremonial procedures, such as the state's participation in the ceremony and expenditure, were set out clearly in the law. According to the law, it was obligatory that cows, sheep, dairy products and other food used in ceremonies worshipping Bogdkhan and Burkhan Khaldun mountains be prepared in advance in four Khalkh provinces. One of the ministers from the five ministries was to attend the Bogd Khan mountain worshipping ceremony, and one of the deputy ministers would attend the Burkhan Khaldun mountain worshipping ceremony. The kings of Zasagt Khan and Sain Noyon provinces would attend the Otgontenger Mountain worshipping ceremony.

Since 1990, a new time of social change, it has become possible to revive national traditions and customs of nature protection in Mongolia, and to incorporate these traditions and customs into state policy. On 16 May 1995, the first President of Mongolia issued a new decree "supporting initiatives to revive the tradition of worshipping Bogd Khan Khairkhan, Khan Khentii, and Otgontenger mountains". The decree pronounces the state's support for initiatives to revive mountain-worshipping tradition as they were described in the original Mongolian Legal Document, "set out according to the official decree" and adjusting traditions to present-day conditions. Since the summer of 1995, Khan Khentii, Burkhan Khaldun, and Bogdkhan Khairkhan Mountains have been worshipped as state sacred mountains. The president has participated in some of the ceremonies.

6.2 Sacred Lakes

Uvs Lake is the largest land-locked sacred lake in Mongolia, situated 743 metres above sea level. Uvs Nuur basin contains five ecological zones — *govi* (cold desert), semi-desert, steppe, taiga, tundra, and glacier — within an ancient Central Asian lake basin spanning one hundred and sixty kilometres from north to south and six hundred kilometres from east to west. Within this limited area, habitats include flood-plain forests, salt marshes, mobile and fixed sand dunes, permanent snowfields, and deciduous and coniferous forests.

Pastoralism is the mainstay of the economy. Dating from ancient times, its traditional form has not caused widespread changes to natural systems. There also exists a small degree of irrigated agriculture.

Uvs Nuur holds great historic treasures, which have not been put into scientific and cultural circulation. Many are thousands of years old. All the mountain valleys contain *kurgans* — ancient

burial sites — creating a unique historical and cultural landscape. Uvs Nuur basin is the object of intense scientific investigation that began at the beginning of the twentieth century and still continues today. The ancient sacred lake, Lake Uvs Nuur, has its own special sutra.

7. State Conservation Policies

Over the last few years the Mongolian government has paid great attention to protecting its pristine environment, in keeping with the vulnerability and specific ecological conditions of the world's biosphere. The government has provided productive assistance in maintaining the ecological balance, implementing several actions toward this end. Examples include: "The Mongolian Law on Special Protected Areas", approved in 1994; "The Mongolian Law on the Buffer Zones of Special Protected Areas", 1997; "The National Program on Special Protected Areas", 1998; and "The State Policy on Ecology", approved in 1997. The sacred mountains of Bogd Khan and Khan Khentii (Burkhan Khaldun) were included in the category "Strictly Protected Areas" by a Mongolian parliamentary resolution in 1992, and Otgontenger Mountain has been accorded special protection. The government has a scheme to gradually include Khan Khentii, Bogd Khan, and Otgontenger mountains in the World Heritage list, and in 1996, Bogd Khan Mountain nature reserve was included in UNESCO's World Network of Biosphere Reserves. Other mountains, including Otgontenger and Burkhan Haldun, are planned to be included in the network.

There is an urgency to establish a protected zone in this region, with the objective of providing sustainable local social and economic development, assisting in improving living conditions of local people, and strengthening environmental protection in the region. In establishing protected zones, specific ecological, social, and economic criteria are taken into consideration. An Area Committee has already been established, consisting of administrative staff from the governmental organization responsible for activities taking place in the region. Local people and the administrative staff of the special protected areas are also involved. The Area Committee's responsibilities include delivering community control, providing comments to the governor, making investments for the regional fund, distributing and controlling expenditure, and introducing regulations and legislation.

References

Shagdar, S. 1997. *Fifty Routes through Mongolia*. Ulaanbaatar, Mongolia: Tacis and the Mongolian Business Development Agency (MBDA).

Sukhbaatar, O. 2002. *Sacred Sites of Mongolia*. Ulanbaatar, Mongolia: World Wide Fund for Nature.

Urtnasan, N. 2001. The Value of Mongolian Sacred Mountains and their Credibility. In *Final Report of the UNESCO Thematic Expert Meeting on Asia-Pacific Sacred Mountains, 5–10 September 2001, Wakayama City, Japan*. UNESCO World Heritage Centre, Agency for Cultural Affairs of Japan, and Wakayama Prefectural Government. 2001. Tokyo: UNESCO.

13. Sacred Beyuls and Biological Diversity Conservation in the Himalayas

by Lhakpa N. Sherpa

1. Introduction

Beyuls are sacred hidden valleys said to be set aside by Padmasambhava[1]. They are refuges and places of retreat, often providing hideouts during periods of conflict. Beyuls are typically isolated, peaceful, tranquil valleys abundant with natural resources including ample water and fertile soil. It is believed that the notion of "Shangri La" in James Hilton's popular fiction, "Lost Horizon", was inspired by a beyul in southeast Tibet.

Beyuls are generally large (hundreds of square kilometres in size), isolated, and vacant mountain valleys. They can be opened by *tertons* (treasure seekers) following discovery of *terma* (secret treasures i.e. ancient texts), which describe the access to these sacred lands. It is believed that only people with pure hearts can gain access to these sites, and that, while many *beyuls* have already been exposed and settled, there are others awaiting discovery.

The beyul concept is rooted in the Nyingmapa tradition of Tibetan Buddhism. Beyuls exist throughout the Buddhist regions of the Himalayas, including Sikkim, Bhutan, Nepal, India, and China. The area covered by this category of sacred natural sites is extensive. It is noted that there may be as many as 108 beyuls in the Himalayas. Some beyuls — such as Pemaco in the Yunnan Province of China — are well known for their natural beauty and sanctity, whereas others may be known only locally. Most communities in the Himalayan mountain valleys tend to associate their homeland with a beyul.

This paper examines the role of beyuls in conserving biological diversity, and examines the influences that erode the power of *beyuls*. It also looks at the complementarities and conflicts between ancient beyuls and modern protected areas.

The case study is based on beyuls in the vicinity of Mount Everest (Jomo Langma), including Khenbalung, Khumbu, Rongshar, and Kyirong valleys. For many centuries, these valleys have been regarded as sacred beyuls. They are located to the south of the Himalayan divide and at the boundary between Nepal and the Tibet Autonomous Region (TAR) of China. The slopes of the Himalayas, including Mount Everest, drain into them. The Khumbu valley lies in Nepal, the Kyirong and Rongshar valleys fall within the boundaries of TAR, whereas Khenbalung is a transboundary *beyul* that is spread across international borders.

Dr. Lhakpa N. Sherpa is a director of the Himal Program at The Mountain Institute (TMI) in Nepal; he has also worked extensively with TMI's Qomolangma Conservation Project, based in the Tibetan Autonomous Region (TAR)

2. Beyuls and Biodiversity Conservation

Beyuls are sacred refuges for people, not for biodiversity. However, inherent natural and cultural qualities of beyuls lend themselves to the conservation of biodiversity. Some of these qualities are outlined below:

- *Beyuls are generally large natural areas (hundreds of square kilometres in size) encompassing entire mountain watersheds and surrounded by mountain ranges. They contain rivers, forests, lakes, alpine meadows, and snow and ice fields, and include human habitations. Such a large area contains diverse habitats, making it suitable for the sustainable conservation of biodiversity. Larger areas are also better able to absorb the impacts of natural and human disturbances. Their widespread distribution offers the possibility of conserving biodiversity across a broad region.*
- *Beyuls are generally located in mountainous areas with steep elevation gradients and diverse topography. For example, the elevation of Khenbalung ranges from less than one hundred metres above sea level to over eight thousand metres. Within this elevation range, many bands of bio-climatic zones (sub-tropical, temperate, alpine, nival, and arid desert conditions) can be found. The physical and climatic variation supports different species of plant and animal life adapted to differing conditions.*
- *Beyuls are located in isolated and inaccessible mountain valleys and are generally sparsely populated. The low population has resulted in relatively undisturbed forests and wild land, harbouring species of plants and animals that may not exist in areas of heavy human disturbance.*
- *Buddhists generally refrain from killing. This attitude is particularly common among people who live within sacred beyuls. There is evidence to suggest that beyul residents once formulated and enforced their own regulatory measures to protect forests and wildlife. When outsiders violated these regulations, the local people objected strongly. For example, the early British explorers visiting the Kharta and Rongshar areas in 1921 reported strong opposition from the local people to their hunting for food. People of sanctified valleys also consider certain natural features, such as mountains, springs, rocks, and forests as dwellings of supernatural beings. The concept of co-habitation makes people more mindful of their activities. Activities such as hunting, polluting, quarrelling, and disturbances of land and water are considered inappropriate and avoided. In some cases, even the cutting down of live trees is discouraged. Although survival necessitates a certain level of natural-resource harvesting, wanton destruction of natural resources within the beyul is generally avoided.*
- *Beyuls are places of retreat for hermits and clerics who practice and teach compassion. For example, Milarepa, a popular eleventh-century poet from Kyirong, demonstrated deep compassion for wildlife and love for wilderness. Milarepa wrote many songs and poems encouraging a spirit of harmony between man and nature in the Himalayas He had many disciples and followers, who later compiled his poems into a book;* The Hundred Thousand Songs of Milarepa[2] *(Mi-La-Ras-Pa and Chang 1999). Later spiritual leaders have also played instrumental roles promoting forest and wildlife protection within beyuls.*
- *Beyul residents accept modern conservation approaches such as the creation of protected areas much more readily, because the concept of biodiversity conservation is in line with their own cultural beliefs. Today,*

most beyuls in the Himalaya are integrated into modern protected areas — such as national parks and reserves. Beyul residents have co-operated with protected-area agencies to conserve biodiversity and the environment. The document drawn in Khumbu in 1921, for example, accepts regulations imposed by governments as "golden yokes" — burdens that are beneficial.

3. The Diminishing Power of Beyuls

The beyul is a powerful age-old concept of a sacred natural site. But the power of beyuls has eroded over time as a result of external and internal factors. Outside influences such as globalization, nationalization, education, cultural assimilation, domination, and tourism appear to impinge on these indigenous belief systems, resource controls and power relations.

Beyuls are no longer isolated refuges. Improved roads, bridges, airports, and communications systems have made these once-isolated refuges increasingly more accessible to the outside world. Roads penetrate into the sacred valleys of Ronghsar and Kyirong. Airfields have been built at the gateways of the Khumbu and Khenbalung areas. The numbers of foreign visitors to these areas is growing at an ever-increasing rate. Although development is necessary, these influences tend to weaken cultural beliefs surrounding sacred natural sites. In the past, such damage appeared to have been prevented through sanctification by spiritual leaders and via agreements among villagers[3]. With increasingly strong outside influences, though, damage is imminent. National and regional laws have replaced locally grown customary regulations governing forest and wildlife conservation.

The *Forest Nationalization Act* of Nepal and the Cultural Revolution in China also greatly weakened traditional, local stewardships. Modern education brings with it its own array of influences, and generally does not integrate the wisdom of traditional indigenous knowledge. Government agencies, resource managers, and scientists alike have thus far overlooked the value of traditional knowledge systems.

Traditions and belief systems are dynamic and change over time. Change is often necessary, when a system becomes outdated or in situations when is unwise to attempt to restore a system to its original state. However, the beyul concept is valid and not yet outdated. Given recognition and support, beyuls can contribute greatly to environmental conservation and the conservation of biological diversity. They can lend cultural support to environmental conservation actions and should not be discarded as anachronistic.

4. Beyuls Versus Protected Areas: Complementarities and Conflicts

Beyuls have been particularly sought after in recent years as places in which to establish protected areas, because of their relatively undisturbed natural environment and their great beauty. They have been accorded a status as both areas for biodiversity conservation and as places for recreation

and rejuvenation. In most cases, beyul residents have accepted the protected areas readily, because they recognize the complementarities between their belief system and protected-area objectives. But protected-area managers and government policies have failed to reciprocate and recognize the importance of the beyul concept in conserving biodiversity. Managers, government bureaucrats, and scientists need to learn more about the role of sacred natural sites, such as beyuls, in conserving biodiversity, and in doing so develop a stronger appreciation of such sites. This learning process could begin from the nursery rhyme "make new friends but keep the old, because one is silver and the other is gold".

In many cases, customary systems may no longer be effective in conserving biodiversity because of modern forces of change. Protected-area status does provide legal, scientific, and technical support. In such cases, stronger application of equitable power-sharing is needed, giving greater authority to local residents in joint- and co-management arrangements. The failure to recognize and reinforce local cultural support for biodiversity conservation not only disregards a potential ally, but could also breed conflict and non-cooperation. This is especially true in the case of protected areas with resident communities.

The Beyuls concept is therefore a powerful cultural basis for conservation, and one that may be more sustainable than governmental imposition of regulations. Recognizing and acknowledging the value of culturally protected natural sites is an important factor in developing and managing protected areas in the future.

5. Conclusion

Beyuls possess natural and cultural characteristics that will continue to favour biodiversity conservation. The main challenge today is acknowledging the role beyuls have as places of power; an understanding that has been diminishing in recent years due to socio-economic and political changes. Awarding beyuls protected-area status has been common practice in recent years, but although in many cases this may be necessary, as customary law of the beyuls can no longer resist mounting external pressure, this protected area status should recognize and complement traditional practices, rather than supersede them. To achieve this, more local participation in natural-resource use and environmental protection within the beyul protected areas should be sought.

Sacred natural sites of differing cultures may not all lend themselves to the conservation of biodiversity. Some sacred natural sites are required to be kept secret, others are not compatible with the concept of biodiversity conservation. Conversely, there are sacred natural sites other than beyuls that contribute considerably to biodiversity conservation. The cultural importance of these sites need to be emphasized and strengthened with respect to local management so that they can develop into effective land units for sustainable biodiversity conservation, with or without being accorded protected-area status.

Notes

1. Padmasambhava was the Indian saint responsible for the introduction of Buddhism to Tibet in the eleventh century. He is a key symbol of the Nyingmapa sect of Tibetan Buddhism.

2. "Snow, rock and clay mountains are Mila's hermitages,
Snow and glacial rivers are Mila's drinking water,
Deer, gazelle and blue sheep are Mila's livestock,
Lynx, wild dog and wolf are Mila's guards,
Langur, monkey and brown bear are Mila's playmates,
Thrushes, snow cock and griffon are Mila's garden birds."

3. A letter of agreement drawn up in 1921 in Khumbu under the guidance of spiritual leader Zatrul Nawang Tenzing Norbu demonstrates the continuous effort made by the people of Khumbu to maintain the sanctity of their *beyul.* In 1920, a village agreement imposed stricter customary laws against animal slaughter and forest cutting on the basis of Khumbu being a sacred *beyul*. These efforts have re-strengthened forest and wildlife protection.

References

Chan, V. 1994. *Tibet Handbook: A Pilgrimage Guide*. California: Moon Publications.

Hay-Edie, T. 1998. Nature, Biodiversity and People of the Himalaya. Paper presented at the Sub-Regional Meeting on Conserving Himalayan Heritage: The Role of the World Heritage Convention. Kathmandu, Nepal.

Linville, R., ed. 1998. *Sacred Mountains and Environmental Conservation: A Practitioners Workshop*. Proceedings of the workshop held at the Mountain Institute in April 1998. Franklin, West Virginia: the Mountain Institute.

Mi-La-Ras-Pa and G. C. C. Chang. 1999. *The Hundred Thousand Songs of Milarepa: The Life-Story and Teaching of the Greatest Poet-Saint Ever to Appear in the History of Buddhism.* Boston: Shambhala Publications.

Samuel, G. 1993. *Civilized Shamans: Buddhism in Tibetan Societies*. Kathmandu: Mandala Book Point; Washington, DC: Smithsonian Institution Press.

Sherpa, L. N. 1998. Doctoral thesis.

UNESCO, 2001. *UNESCO Thematic Experts Meeting on Asia-Pacific Sacred Mountains, Final Report*. Meeting held in Wakayama City, Japan, 5–10 September, 2001. Paris: UNESCO.

Zangbu, N. T, and F. Klatzel. 2000. *Stories and Customs of the Sherpas*. Kathmandu, Nepal: Mera Publications.

14. Integrating People and Culture within Environmental Strategies

by Edmond Moukala

Mr. Edmond Moukala is an Assistant Program Specialist in Culture at UNESCO's Beijing office.

The integration of people and their culture with environmental protection strategies focuses strongly on the basic needs of local communities living within and around protected areas. In this regard, it is important to assess the impact, both positive and negative, that local traditional cultural practices have on the environment.

Traditional land use does not necessarily damage the environment. Over centuries, indigenous peoples have developed their own systems for land management and resource use, reflecting their understanding of their land and ecology. These traditional systems have for the most part been successful, however not all customary practices are sustainable, and there are certainly limitations to the conservation practices of indigenous peoples. In situations where traditional practices do constitute an environmental threat, local authorities will be encouraged to work with communities to resolve the conflict.

Stan Stevens noted in the introduction to *Conservation Through Cultural Survival*: "Indigenous peoples' knowledge, conservation beliefs and values, environmentally adaptive and sensitive land use, resource management practices, and determined defence of territory and natural resources have enabled many of them to inhabit their homelands for centuries without devastating their ecosystems and biodiversity" (Stevens 1997: 2). Consequently, in the past few years, international conservationists and a number of indigenous peoples have begun to appreciate the value of new alliances and partnerships. More recent and innovative environmental strategies and policies not only create ways to keep local communities on their traditional lands but also permit limited traditional land-use practices.

It has been revealed that many traditional practices not only do not damage the environment but actually enhance it. Nepal provides one such example. For hundreds of years certain grasses were harvested annually by local communities in lowland areas in Nepal to provide materials for local wattle and housing thatch. The cutting and burning of these tall grasses, belonging to the riverine grasslands, had long been part of ecosystem management system employed in these areas — a system that involved creating grasslands and maintaining them against forest encroachment (Stevens 1997: 68–69).

In ethnographic literature, we find that people in Yunnan too have used their environmental resources in rational and sustainable ways for centuries, and their traditional belief systems have served to foster and strengthen environmental protection. The Naxi are one of

the best examples of a people whose traditional culture serves to protect nature. This harmony is reflected in several traditional Dongba texts, which commend us to preserve nature and the environment. In practice, the Naxi traditionally refrained from hunting during the summer months when the animals reproduced, and prohibited the cutting down of trees on their sacred mountains. Water was also especially important, and in the past the Naxi maintained their watersheds with great care. The Naxi paid particular attention to the purity of the water that flowed through their villages, especially in Dayan Lijiang Old Town and the villages scattered in the Lijiang plain. Customary law determined times during the day when the water could be used for drinking and for washing vegetables and clothes. Neither dirty water nor garbage was thrown into the rivers that flowed through the towns and villages. All of these customs have broken down in recent years.

In Tibet, religious belief dictates that sacred mountains should remain untouched. Pilgrimages circumambulating sacred mountains are carried out regularly, but woe to those who attempt to scale their peaks!

People and Culture

Why integrate people and culture into environmental strategies? The answer is quite simple. Integrating people and their culture and customs into the environmental process and management system avoids frequent long-term conflict with local, indigenous people who might otherwise sabotage the protected area.

There are many examples of other designated protected areas in numerous countries where local authorities believed that human use and habitation had to be severely restricted in order to protect the land. This policy has invariably led to conflict. Many governments, in the quest to create protected areas and national parks, have simply re-located — forcibly moved — the population from the park areas. Local residents have been moved to locations outside the protected areas where they "do no environmental harm" to the land; that is to say, where they cannot cut down trees to use for firewood or timber for their houses, hunt animals for their food, or clear fields to grow food. However, experience has shown that this is an expensive non-solution, as it does not resolve the problem.

Removing people from their traditional lands not only creates anger but can also hasten the social and physical breakdown of the local people. Many recent examples from Laos illustrate this problem.

Most land in the world today has been touched and essentially formed by some form of human activity. For example, the condition of many alpine meadows today represents hundreds of years of grazing activity, fire management, and so forth, and is another factor in the human-nature interaction that is sometimes overlooked. This fact reinforces the importance of maintaining traditional peoples in their traditional locations, continuing their traditional land-use practices.

To conclude, it is essential to guarantee the involvement of local people and communities as an integral part of environmental protection strategies. By incorporating local indigenous people into the management process, indigenous people will be able to continue to work and live on their traditional lands. Although disputes may arise as to the extent and degree of local community participation and consultation about and within the management process, it is nonetheless generally agreed that local communities should participate in the process of creating new policies and regulations, and that they should benefit economically from such changes.

Acknowledgements

I wish to thank UNESCO Bangkok and the Nature Conservancy for their contribution to this paper.

References

Stevens, S., ed. 1997. *Conservation through Cultural Survival: Indigenous Peoples and Protected Areas.* Covelo, California: Island Press.

15. Adam's Peak Sacred Mountain Forest

by Anoja Wickramasinghe

Background

Professor Anoja Wickramasinghe is head of the Department of Geography at The University of Peradeniya in Sri Lanka

The cultural context of Sri Pada (commonly known in English as Adam's Peak) is complex and intimately connected with religion, history, belief systems, livelihoods, and the local understanding of nature. Adam's Peak is the highest point in the western shoulder of Sri Lanka's anchor-shaped Central Mountain massif. The conical-shaped peak rises up to an elevation of 2,243 metres (7,360 feet) and is the most outstanding feature of the whole range. It is marked with escarpment slopes in the south and a deep slope towards the north. The peak has been the subject of great interest for conservationists, the clergy, and the general public. Its commandingly elevated position and the sacred footprint on the rock summit enhance the tremendous spirituality of the Peak Wilderness. The sacred footprint — *Sri Pada* or *Siri Pathula* — is located on Samantha Kuuta Parwathaya, the highest mountain peak in the area known as Samanala Adaviya.

Throughout Sri Lankan history, Adam's Peak has been valued holistically. Its appearance above the mountain pinnacles, its obvious scenic beauty, and its capacity to support life have all attributed in strengthening its cultural context and its holistic nature. This unique mountain forest lies between latitudes 6° 45' and 6 57' north and longitudes 80° 27' and 80°0 50' east, and varies from 1.2 to 12.8 kilometres in width (0.8 to 8.0 miles). The total area under forest cover is estimated to be about 223.8 square kilometres (86.4 square miles). The crest line of the Samanala Wetiya (Samanala Range) runs in an east-west direction at an elevation of about 1829 metres, or 6000 feet. It has a pronounced effect on the surface hydrology of Sri Lanka, as water drainage is divided along its slopes.

The holistic and cultural significance of sacred mountain sites have been afforded little attention in the past. Waves of international interest have approached Sri Lanka more in the form of various conventions. As a result, various sectors have promoted innovations to the national documentation process and policies regarding conservation, and the concept of awarding areas status as nature reserves, protected areas, national parks, and sanctuaries for conservation purposes has gained credence in recent years. However, most of these interventions have not been accorded adequate attention. Ignorance regarding human-nature interactions has alienated culture from conservation measures, and the culturally important aspects of conservation in these mountain forests, which are of such high cultural significance, have been appreciated only in terms of specific, isolated cultural sites.

The depletion of forest has resulted in the deterioration of forest-based livelihood systems. It has been estimated that the forest cover of the country has declined from 80 percent of the total land area in 1881 to about 22 percent in 1996. More than 90 percent of forest in Sri Lanka is under the control of the Forest Department and the Department of Wildlife Conservation. Nearly 12 percent of the total forested area, about 783 square kilometres (302 square miles), falls within 43 protected areas. State authority over the forest as regards administration has been accepted from ancient times, while people have been able to exercise their interactions as guardians. Potential conflicts between legal ownership and traditional relations have been tempered by the difficulty of separating the forest from local culture. Forests are believed to be places of great power, donated by ancient kings to Buddhist settlements to be used for meditation. Local perspectives on the forest and the forest landscape have enriched local interest in conservation.

Cosmographical analysis of the sacred mountains of Sri Lanka provides a much broader community-based context for promoting the conservation of sacred sites. There is evidence to show that many fragile ecosystems, mostly the natural forests of the mountains, were donated to 'Sanga' — the Buddhist clergy — so that the Buddhist settlements could maintain the sacred groves. Places like Ritigala, Kalugala, Mihintale, Dimbulagala and Vedahitikanda are examples of such places and are protected today under the Fauna and Flora Protection Act. The Buddhist monasteries at these sites have enhanced the sanctity of these forests and further encouraged local social commitment towards conservation. These sites are in powerful positions; they are important links in the human-nature interface. They are culturally inculcated landscapes that have guided non-forest inhabitants to lead a life in harmony with nature.

The specificity of Adams' Peak is closely associated with its religious, historical, and cultural significance. Unlike many other sites that encompass monasteries and have been recognized as sacred, Adam's Peak has not earned the sacred territorial identity it deserves. This is mainly because the wilderness area known as Samanala Adaviya itself encompasses a vast tract of forest extending over twenty-two thousand hectares. Although Sri Lanka has established institutional mechanisms to claim wilderness areas for nature conservation and for the conservation of wildlife and natural forests, it has yet to establish appropriate institutional mechanisms to deal with the sanctity of forests, or to declare and safeguard sacred mountain forests. As a result, the cosmographic and cultural context regarding the sacred nature of the environment, which is found in physical space and the social and psychological domains of conservation, has not been fully incorporated. The hundreds of monasteries and shrines in the forest, established by ancient rulers for the conservation of nature and culture, reflect the serene philosophy that they tried to instil into the local lifestyle.

This paper is an attempt to consolidate several years of learning accomplished through a process of close interaction and communication with local communities. I initiated this process in 1994 by undertaking in the peripheral areas of Adam's Peak Wilderness (Wickramasinghe 1995). This led to my establishing links with local communities and learning about and recording local practices. While this process of information gathering continued for a period of eight years, another research

I undertook on ethno-forestry practices in 2001–2002 enabled me to focus on the sanctity of the Samanala Adaviya, and to compare the typology of similar places across the country. This paper on Adam's Peak Wilderness, Sri Lanka's sacred mountain forest, is not an attempt to romanticize the vast functions of this unique mountain forest, but to examine and share local perceptions, experience, and cultural roots in the light of conservation issues, and to discuss the philosophy behind local innovations.

Sustainable progression towards biodiversity conservation requires a deep humanistic approach, to accommodate the sacred value of nature. The sense of sanctity or sacredness, established and strengthened through several hundred years of contact with, observation of, and learning about the functions of Adam's Peak sacred mountain forest, has assured the survival of this habitat. This paper explains briefly how this sacredness has evolved and the mechanisms through which traditional people have been able to safeguard this sacred mountain forest without recourse to legal institutions and policy interventions.

The Pride of the Nation

The Peak Wilderness Sanctuary was declared in 1940. Responsibility for its management is vested in the Sri Lankan Department of Wildlife Conservation. The sanctuary's importance in the conservation of biodiversity and the environment has been well recognised, however its religious, cultural and social implications have not yet been fully endorsed. The mountain is an important determiner of climate and a water source for three of Sri Lanka's major rivers; Kelani, Kalu and Walawe, which extend its life-supporting capacity by providing water to millions of people. The range of ecological zones within this mountain forest includes tropical lowland, sub-montane, and montane forests. Coupled with morphological variations, these provide the basis for its outstanding diversity. The diversity of its fauna and flora has been recognised from the perspective of conserving natural habitats and endangered species including rare reptiles, amphibians, insects, and floral species.

From a humanistic perspective, supported by historical evidence, it can be argued that conventional innovations on conservation have been influenced by the historical evolution of landscapes, religion, and perceptions. It has long been accepted that the Samanala Adaviya wilderness area is dedicated to the purpose of safeguarding the sacred footprint of Lord Buddha located at the peak, overlooking the surrounding area that is said to be under the strict sanctions of the god, Sumana Saman. Supported by a perception of its extraordinary powers, diversity, and dense structure, this mountain forest has remained an uninterrupted and unique ecosystem. It has become intertwined with the lifestyle and livelihood of people at various hierarchical levels, including the local level of families, communities, and fringe-dwellers and the regional and national levels. Similarly, through various aspects related to its history and function, it has strong contextual associations with Buddhist clergy, shrines, traditional healers, native physicians and conservationists. How are the multiple aspects of Adam's Peak to be simplified as integral elements of this sacred mountain?

There are three interrelated facets. The first deals with religion, the belief system and culturally evolved value systems, in which conservation has been assured through socially accepted taboos and sanctions, including spiritual concerns that encompass therapeutic values dealing with purity, superiority, sanctity, and generosity. The second is the ecological value of the mountain's life-supporting capacity and the amenity value of this unique mountain forest. The peak is very popular for its panoramic view of the sunrise and offers a sense of the world beyond human control: that occupied by gods and goddesses. The third facet concerns the local resource-based lifestyle, which has been sustained harmoniously with nature and goods regenerated through natural processes, and has evolved in line with the local belief system and understanding of nature (Wickramasinghe, 2002).

Sri Pada — The Sacred Relic

The sacred footprint, 'Sri Pada' or 'Siri Pathula' has to a great extent become the nation's pride. The sacred footprint is on the summit of this mountain range, and has more than 2,500 years of history. According to Mahawansa, the sacred relic is the footprint of the Buddha, who arrived in Sri Lanka in around 577 B.C. The god Saman, the tutelary divinity or the territorial god of the peak wilderness, undertook the task and responsibility of safeguarding the relic and the surrounding area. The Peak has many names, including 'Samanthakuta' or 'Samanalagiri', while the mountain range has been denominated 'Samanala Wetiya'. It is believed that the true impression was created in precious stones by the god Saman, and that this true relic lies beneath the large rock summit. The artificial print was created on the orders of the Sinhalese monarch, Kirthi Sri Rajasinghe, after his pilgrimage to this sacred point, as his way of preserving the sacred relic without exposing the true footprint.

Two to three million pilgrims annually venerate the sacred footprint at the shrine on the summit of Adam's Peak.

The sacred footprint is revered by millions of pilgrims annually. The sanctity of the mountain forest is enhanced by the belief that it is the terrain of the tutelary divinity, the god Saman, worshiped by Buddhists and Hindus alike. The terrain conditions are harsh, marked with rock cliffs, waterfalls, gullies and steep slopes, and it is essential to follow the trails from the non-forest periphery to the summit. Two trails lead to the summit, the Hatton-Maskeliya trail from the north and the Palabaddala trail from the southwest. The Palabaddala route is known as the 'Raja Mawatha'. Five trails starting from various village hamlets on the southern fringe join it below the rock escarpment. To begin the annual pilgrim season on the

full moon day in December, the ancient kings used to follow this trail in a procession carrying the statute of god Sumana Saman to the summit. The pilgrim season ends on the day of the full moon in May. At the end of the season, the statute of Sumaana Saman is brought down to where it is kept in Saman Devalaya in Palmadulla. No-one is permitted, according to tradition, to climb this sacred mountain during the off-season (between May and December). Rules of the terrain are accepted and followed by the pilgrims. The presence of the statue on the summit during the season of god Sumana Saman is considered a symbol of safety, security, and guidance. Violating the rules on climbing the mountain is generally accepted as an offence and can lead to severe punishment. There have been cases of people becoming lost in the wilderness, and some have died inside the forest. A strong network of Buddhist temples is located at the periphery. Associated with various village hamlets, they share the responsibility of providing religious services during the season.

The cultural motives for conservation are influenced by the presence of the sacred relic and are guided by the belief system. This is connected to the way in which traditional villagers perceive the forest.

Those who live in the traditional villages, particularly on the southern fringe, extending from Hangarapitiya in the west and towards Erathna and Gilimale in the east, perceive the forest as a living organism. Traditional villagers strongly believe that the forest itself is sacred and full of spirits and divinities. The local belief system is intermixed and largely guided by the teachings of Lord Buddha. Lord Buddha describes the forest in these terms:

> *"The forest is a peculiar organism of unlimited kindness and benevolence that makes no demand for its sustenance and extends generously the products of its life activity: it affords protection to all beings, offering shade even to the axe men who destroy it".*

Appropriation of this mountain forest for religious purposes has a long history. Many ancient scripts indicate that in ancient times, Sri Lankan kings dedicated the forests to Buddhist clergy, to practice Buddhism. Two to three million pilgrims annually venerate a shrine on the summit of the mountain, at the sacred footprint. Buddhist monks occupy the rock caves on the southern slopes of Kudawa, Erathna and Gilimale, using them for meditation.

Multicultural Significance

The ethno-cultural context associated with this unique sacred site justifies the overwhelming importance of this 'sacred mountain forest'. The belief systems of the ethnic groups here provide mechanisms relating to ethnocentrism in conservation. The culturally significant interaction between various ethnic groups in Sri Lanka and this sacred mountain forest has been subjected to serious deterioration during recent decades, due to the politics of social fragmentation.

One of the unique features of Adam's Peak is its multi-cultural significance. There are strong grounds for Buddhists, Hindus, Muslims, and Christians to promote a unified interest in the conservation of the sacred mountain site. The majority of Sri Lankans are Buddhists, and

Samanala Adaviya, the sacred mountain forest of Adam's Peak, extends over twenty-two thousand hectares. For Buddhists and Hindus alike it is the abode of the god Sumana Saman.

believe that the sacred footprint on the summit corresponds to the impression of the left foot of Lord Buddha. When Buddha visited 'Saman-gira', the home of the god Sumana Saman, he left the footprint, and the god took guardianship of the relic. It is believed that pilgrimages began during the reign of King Walagambahu, a Sinhala monarch. The guardian divinity — the god Sumana Saman, had made the presence of the sacred relic known to him. Ancient inscriptions reveal that the monarchs of Sri Lanka have promoted the construction of trails for those who climb the mountain to revere the footprint.

Some of the old legends and beliefs have earned the attention and respect of Muslim doctrine as well. It is their belief that the relic is the footprint of Adam, and that for penance, Adam stood on the peak on one foot for a thousand years when he was cast out of paradise. In the tenth century, the peak was called "Baba Adam-Malai" or "Father Adam's Mountain". Since then it has become a place of pilgrimage for the followers of the Prophet. The Christian belief is that it is the footprint of Saint Thomas, who is said to have brought Christianity to Sri Lanka, and Hindus believe it to be the footprint of the god Shiva, left after his world-creative dance. A full account of the beliefs associated with the sacred mountain of Adam's Peak needs to be ascertained.

Purity and Life-Supporting Capacity

People's understanding of nature is connected with its function in their belief system and religion. As was discussed by Vannucci (1998), referring to several examples, the sacredness of sacred groves is connected with the greater forest. The detached islands of forests such as Gilimale, Bambarabotuwa and many others that are located in isolation outside this vast forest tract are considered to be extensions of the greater wilderness area.

The humid tropical forest that envelops the mountain range is a symbol of the unfailing generosity of nature in sustaining human life. This structure, with its life-supporting capacity, varies across space. Its service functions are highly valued: the forest acts as a climate regulator and assures human sustenance by replenishing soil and water. It is believed that the waters flowing into the streams and released in springs have curative and preventive effects, because they trickle through the layers of canopy and the roots of medicinal plants, thus becoming holy water. The regeneration of materials consumed by man is also unique to the ecosystem. These include materials used for food or medicinal purposes. Every plant in the wilderness area has multiple uses,

and contributes to its sustainability and the livelihood of the population. The purity of its air, the flourishing green cover, the sound of the birds, and its richness and diversity directly contribute to psychological relaxation.

Biodiversity and Lifestyle

The wilderness area consists of various trees, shrubs, rhizomes, bamboos, lianas, pandanas, and herbs. The valleys and riverine areas are thick in vegetation cover; dense and difficult to cross and highly diverse. In the south, non-timber resources of the forest ecosystem include major staple ingredients. Beverages and porridges are made using Eramusu (*Hemidesmus indicus*), Hathavariya (*Asparagus recemosus*), and Weni-wel (*Coscinium fenestratum*). A treacle-like crystal sugar made out of the sap of Kitul (Caryota urens) is a source of energy. Houses are constructed using timber, binding materials, and pandanas, while household utensils are made locally using the raw materials of the forest. More than half the households in the region use a variety of forest produce (seeds, nuts, fruits, and roots) to supplement their staple diet. The most widely used species are Thiththa-eta (*Trichadenia zeylanica*), Pus-eta (*Endata phaseoloides*), Hal (*Vateria copallifera*), Wal-del (*Artocarpus nobilis*) and tubers such as Katu-ala (*Dioscorea penetaphylla*), Wel-ala (*Dioscorea alata*), and Hiritha-ala (*Dioscorea oppositifolia*).

For traditional physicians, the Samanala Adaviya is a refuge for medicinal plants, and more than 640 species of medicinal plants are obtained from the forest. It is worth noting that the food habits associated with local plant life, and the methods they use to prepare and process local plants are unique to these communities and meet a diversity of food and nutritional requirements. Principles of conserving biodiversity to meet diverse human needs have evolved in these areas over generations. Their knowledge of the forest ecosystem, its functions, the phenological cycle and the composition, distribution, and utilization of species and habitats should be considered as a sacred relic to be preserved for the future.

Philosophy and Principles

Local communities living in close proximity to wilderness areas have a better understanding of the laws and functions of nature. A local inhabitant who has spent more than fifty-six years of his life living in a rock cave in the forest, surviving only on forest produce, has a holistic vision of his forest:

> *"Siripa Adaviya" is superior to all manipulated systems; full of great powers. This should be treated subjectively. This is a huge living organism. It has produced various habitats for thousands of flora and fauna. This Excellency nurtures the life forms and maintains diversity across the terrain. It provides food, water and shelter and regenerates materials season after season and sustains conditions to support all living beings. Its superiority cannot be explained, but should be understood. The sacred mountain forest has sustained itself through natural processes, and every plant and animal within it can be found to be useful".*

The underlying principles promoted by the local people through several generations of experience are related to forest conservation. In this regard, the basic principles of Buddhism have long been accepted and enforced in favour of conservation. Any clearing of the sacred mountain forest, which is a living organism that provides protection, is against forest teachings, as Buddhists renounce the killing of living organisms, which is seen as an *Akusala* or sin. These beliefs have been strengthened through the territorial practices of traditional communities. One such practice found in scripture has been embedded into societal rules, and is based on the merit of conservation and creation of forest. Human activities contributing towards conserving living beings and their nurturers are considered meritorious.

The philosophy behind paying respect and gratitude to the forest has also been enriched by the notion of sacredness. The devout worship and pay homage to this sacred mountain forest before dawn. This sanctity has been evolved in relation to three aspects. Firstly, it is related to revering the footprint. Secondly, relates to offering gratitude to the territorial god, Sumana Saman, for safeguarding the sacred relic and sacred nature through its life-supporting capacity. And finally, it is related to the unfailing generosity the forest extends to the people in the adjacent terrain. Another feature noted here is connected with human conduct. The forest is considered to be a resting-place of gods and demons. This attitude has promoted non-exploitative and harmonious interactions. People refrain from removing huge trees that they believe are inhabited by celestial beings or demons, and some of the trees are considered untouchable. Several hundred years ago Adam's Peak itself was considered an untouchable living organism. Conservation under these circumstances is also recognized as a way of securing the generosity of the great powers. There are many stories associated with sufferings or misfortunes resulting from cutting trees occupied by territorial gods. The sense of purity, preservation, and conservation also influences management principles. In this sense, every effort was made to prevent pollution. Worshipers followed ritual cleansing practices, and women were not permitted to enter the forest or join the pilgrimage during menstruation and after childbirth. Penalties for breaking such regulations were severe.

Shared responsibility and a sense of ownership have resulted in promoting collective conservation. Local people are part of the system and share responsibility for conserving Samanala Adaviya. This sense of ownership allows them to contain personal desires in order to satisfy the needs of their communities. The living forest is accepted as part of the system but under the authority of the god Sumana Saman. Traditionally, twigs are hung on the branches of large trees located beside the forest trails to secure permission to enter Samanala Adaviya. Making vows is also common among pilgrims and peripheral dwellers as a means to plead for generosity, sympathy, and forgiveness. The vows are meant to secure them access and use of the forest's resources. The symbolic meaning of these practices is associated with their concern for conservation.

But there is a well-accepted difference between pilgrims and the local inhabitants. Pilgrims have no rights over forest resources. It is standard practice to educate those who ascend the mountain to revere the scared footprints for the first time in accepted ethics and conduct. They are told

not to touch the sacred forest nor take even a leaf from it, to be vegetarians, to wear clean clothes (preferably white), to use words of kindness, and to express collaboration during their pilgrimage by following the guidance of a well-experienced teacher or 'guru'.

The summit of the Holy Mountain, Sri Pada — Adam's Peak

In ancient times, every effort was made to keep the resources of this sacred mountain forest untouchable to outsiders. The local people strongly believe that 'Siripa Adaviya' (the mountain forest) should not be referred to as a mountain, but should be considered an "Excellency" — safeguarding the sacred relic and exercising great power and unique functions. Indigenous people also use the term "Excellency" when they talk about mountain forests to express the forest's superiority over other forests (Wickramasinghe 1997 and 2002).

Conclusion

It is apparent that the mountain forest in Sri Lanka has been conserved for worship and functional purposes over many generations. Its traditional uses are significant in maintaining local culture, especially in terms of food and the medicinal customs of local communities. The presence of the sacred footprint and acceptance of the Samanala Adaviya as the domain of gods have inspired people to use it for worshipping, making offerings, and to perform rituals. The conventional practices of the pilgrims and the lifestyle of the traditional fringe dwellers have been paramount as regards the conservation of biological diversity. In the rural landscape, the Samanala Adaviya serves as a refuge. Since this area has been protected since time immemorial, the biodiversity unique to this mountain ecosystem has been preserved. Under these circumstances, Adam's Peak is of significant relevance to the implementation of Article 8J of the *Convention on Biological Diversity*, which states that, subject to national legislation, contracting parties shall "as far as possible and appropriate":

> *"respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and to promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices".*

The ethno-forestry practices of traditional communities provide strong socio-cultural basis for conservation.

From the perspective of UNESCO initiatives, Adam's Peak Wilderness could be considered one of the best examples of an area embracing cultural integrity and biological diversity. The socio-

cultural values of people in the Adam's Peak region have made a tremendous contribution to the conservation of biodiversity (Ramakrishnan 1998; Vannucci 1998; Hay-Edie and Hadley 1998). From these multiple perspectives, it is clear that this sacred mountain forest merits the status of a World Heritage Site. Samanala Adaviya unifies the interest of local people, combining cultural diversity into a paradigm of biodiversity conservation.

References

Hay-Edie, T. and H. Hadley. 1998. Natural Sacred Sites: A Comparative Approach to their Cultural and Biological Significance. In *Conserving the Sacred for Biodiversity Management*, edited by P. S. Ramakrishnan, K. G. Saxena, and U. M. Chandrashekara. New Delhi: Oxford & IBH Publishing; Enfield, New Hampshire: Science Publishers Inc. (in association with UNESCO), 47–67.

Ramakrishnan, P. S. 1998. Conserving the Sacred for Biodiversity Management: Conclusions and Recommendations. In *Conserving the Sacred for Biodiversity Management*, edited by P. S. Ramakrishnan, K. G. Saxena, and U. M. Chandrashekara. New Delhi: Oxford & IBH Publishing; Enfield, New Hampshire: Science Publishers Inc (in association with UNESCO), xiii–xxiii.

Vannucci, M. 1998. Sacredness and Sacred Forests. In *Conserving the Sacred for Biodiversity Management*, edited by P. S. Ramakrishnan, K. G. Saxena, and U. M. Chandrashekara. New Delhi: Oxford & IBH Publishing; Enfield, New Hampshire: Science Publishers Inc. (in association with UNESCO), 17–29.

Wickramasinghe, A. 1995. *People and the Forest: Management of the Adam's Peak Wilderness.* Colombo, Sri Lanka: Sri Lanka Forest Department, Forestry Information Services.

———. 1997. Anthropogenics Related to Forest Management in Sri Lanka. *Applied Geography*, Vol. 17, no. 2: 87–110.

———. 2002. Conservation Innovations of Peripheral Communities: Case Study of Adam's Peak Wilderness. Paper Presented at the South and Central Asian MAB Meeting of Experts on: Environmental Conservation, Management and Research, 15–18 October 2002. Hikkaduwa, Galle, Sri Lanka.

16. The Role of Ethnobotany in the Conservation of Biodiversity

by Pei Shengji

Abstract

Ethnobotany as a discipline is concerned with the relationship between people and plants. It includes all aspects of the way people perceive, value, and use plants in their material and cultural lives; whether as a source of material products — for instance, for food, fuel, medicine, construction, or animal fodder — or for non-material purposes such as beauty or spiritual powers. The application of ethnobotany, in associating people's customs with plant conservation and utilization, is important in the study of culture, environment, and sustainable development today. The maintenance of biodiversity and cultural diversity is of global concern. Biodiversity and indigenous knowledge are interrelated and interactive. Using sacred sites and ethnic minority cultures in Yunnan, China, as examples, this paper discusses the potential contributions ethnobotany can make to biodiversity conservation.

Professor Pei Shengji is the Director of the Department of Ethnobotany at the Kunming Institute of Botany of the Chinese Academy of Sciences

1. Introduction

1.1 Ethnobotany and its Application

The term ethnobotany refers to "the study of the direct interaction between human and plant populations; it classifies plants, develops altitudes and beliefs, and teaches about the use of plants. While human behaviour has a direct impact on the plant communities with which they interact, the plants themselves also have limitations vis-à-vis humans, this interaction mix is the focus of ethnobotany" (Ford 1978). Ethnobotany is a cross-disciplinary subject incorporating aspects of botany, ecology, cultural anthropology, economy, and the social sciences, and is often engaged within participatory approaches. Applied ethnobotany attempts to deal with the real issues people face in relation to plant conservation and use. These often have botanical, ecological, social, cultural, economic, and political dimensions. Ethnobotany plays an important role in comprehensive studies of culture and the environment.

Ethnobotany's contribution is not limited to the documentation, inventory, and description of indigenous knowledge regarding the use of plants and the natural environment; it also has an important role to play in the conservation of nature and culture, particularly in biological diversity and the diversity of the word's traditional human cultures. For instance, traditional medicine and the use of edible plants for food differ from one region to region and from culture to culture (Pei 1996).

People in many rural communities have expert knowledge of the properties and ecology of local plants, and rely on them for much, sometimes all, of their food, medicine, fuel, and building material needs, as well as for other products. Much of this knowledge is being lost with the transformation of local ecosystems and local culture. Over-harvesting of wild plants is increasingly common, linked to habitat loss, an increase in local usage, and the growing demands of trade. The long-term conservation of plant resources and the knowledge associated with them benefits local people and safeguards their potential use by communities in other places (Martin 1995). Ethnobotany has therefore been recognized as a research tool and a viable approach for studying the sustainable use of natural resources and conservation (Martin 1995; Pei 1996, Cunmingham 2001; Hamilton 2002).

However, applied ethnobotany is a new subject in ethnobiological sciences, involving transferring, reviving and cultivating ethnobotanical knowledge among different social groups within intra- and inter-communities (Pei and Xu 2002). Scientists have identified a knowledge gap in natural-resource management following the failure of the technology of the Green Revolution in terms of environment conservation and sustainable resource use. Studies on ethnobotanical knowledge systems have great potential and serve as an alternative approach to biodiversity conservation and sustainable resource use in the most bio-cultural and diverse environment regions.

1.2 Yunnan: Sacred Natural Sites and Ethnic Minority Cultures

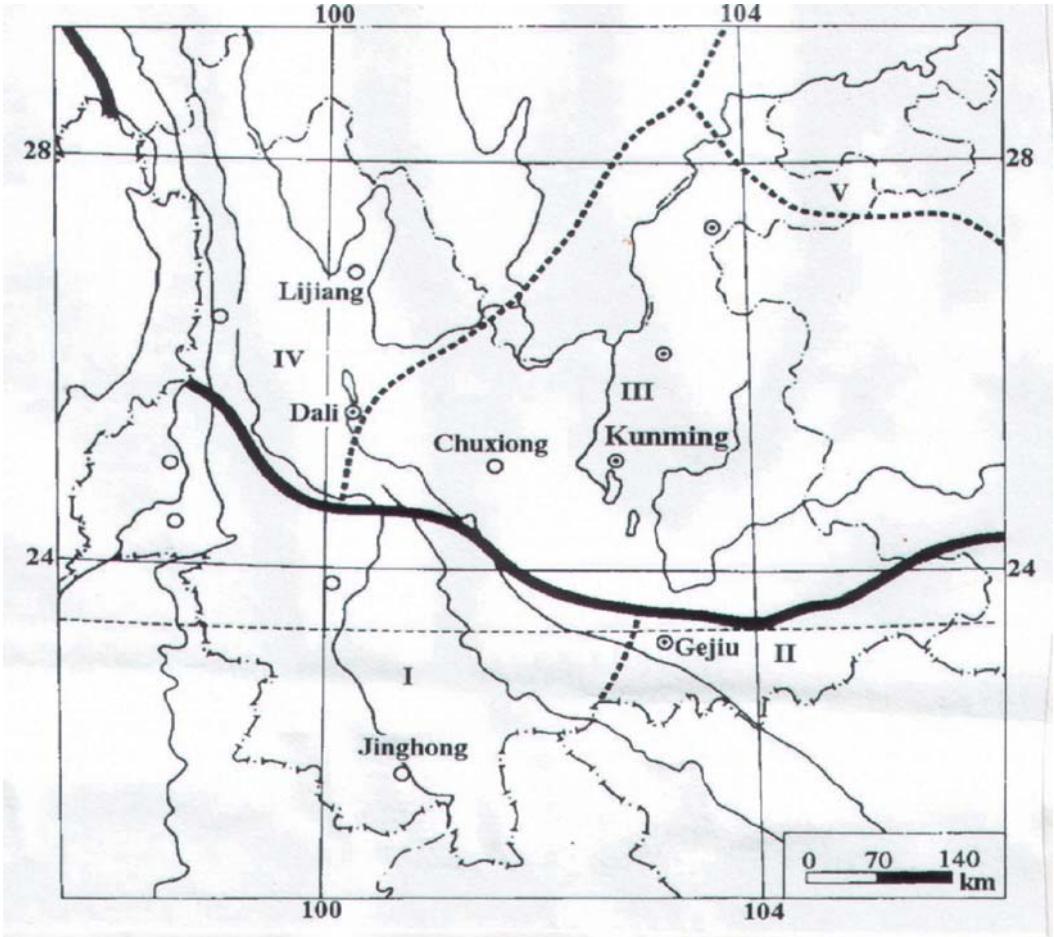
Yunnan is a mountainous province in southwestern China with a land area of 380,000 square kilometres, of which 94 percent is mountainous. Elevation varies from 80 to 6740 metres. The general topography of Yunnan can be roughly divided into three geographic areas:

1) *An area of high mountains with deep valleys in northwest Yunnan;*
2) *An area of large lakes in central Yunnan; and*
3) *An area of hilly terrain and river valleys in southern Yunnan, the tropical area of Yunnan.*

For many years Yunnan has been known for its rich and diverse flora and fauna. Approximately eighteen thousand species of higher plants and 1737 species of vertebrates are found in Yunnan, representing 51.8 percent of the plant taxa and 54 percent of the total vertebrates species that have been identified in all of China.

Yunnan is a mountainous region characterized by great biological and cultural diversity. Situated at the roof of inland China and Montane Mainland Southeast Asia (MMSEA — the ecoregion spanning the upland areas of the Greater Mekong Sub-Region, including Vietnam, Laos, Cambodia, Thailand, Myanmar and the southwest provinces of China), it has six major watershed systems (including the upstream of Yangtze, Mekong, Salween, Red River, and Pearl River) and borders Vietnam, Laos and Myanmar. The topography has shaped diverse, complex microclimates leading to a broad range of farming practices, managed via a mosaic of microenvironments or micro-sites even within watersheds and villages.

Yunnan is well known for its multi-cultural social status. Twenty-six different ethnic groups inhabit Yunnan. The Dai people have a total population of one million mainly living in Xishuangbanna



Map 1. *Geographic area of Yunnan*

in the south, and the Dehong area in southwest Yunnan. The Dai, as an indigenous group in Yunnan, have a long history of traditional culture; nature conservation is part of their customary lifestyle. The Dai perception of the interrelationship between human beings and their physical environment is that it consists of five major elements: forest, water, land, food, and man. They believe that the forest is man's cradle. Water comes from forests, the water feeds the land, and food comes from the land. Human life is supported by the forests and forests are one with the supernatural realm.

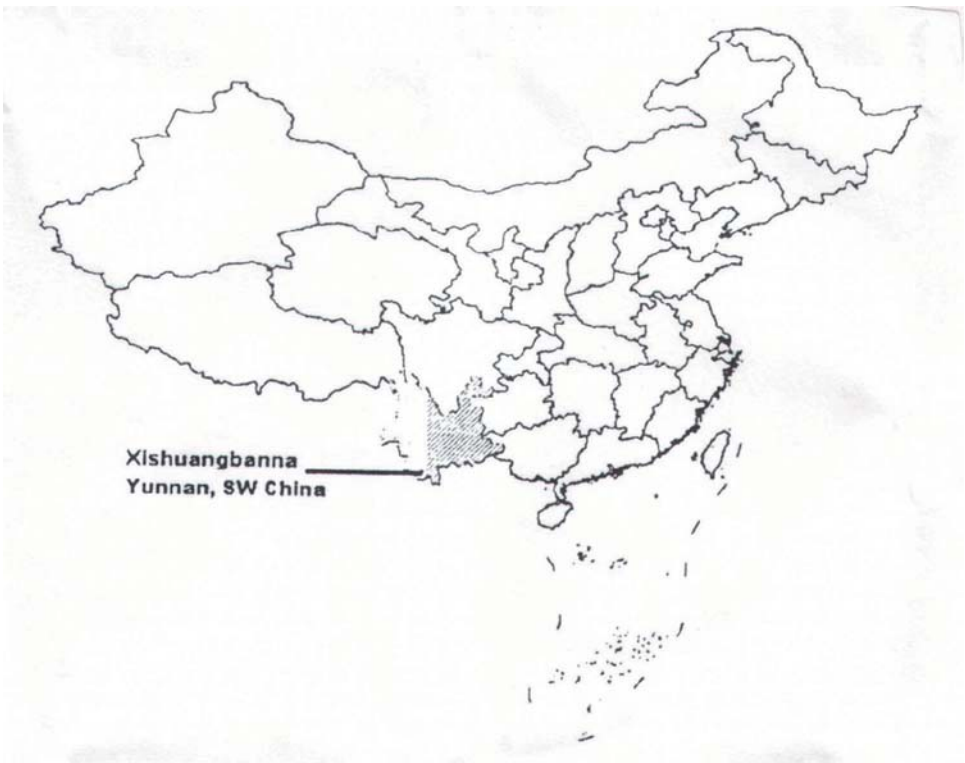
The worship of plants and animals has been practiced in China since ancient time. The "Feng Chan" ritual of China's ancient emperors consists of worshipping a mountain to protect mountain forests (Wang.1988). In Yunnan, worship of plants and animals by ethnic Yi, Lahu, Hani, and Dai has been reported in a number of published papers (Liu et al. 1999, 2000; Pei 1991; Pei and Luo 2002).

Yi people in the Chuxiong area of Yunnan have a long tradition of preserving forests in their surrounding mountain environment and have an extensive concept of holy trees and sacred forests

for various reasons. Ethnobotanical study in the area has recorded twenty-one species of plants that are common worshiped by Yi-villagers. A study at the Hongqiang village in Zixi Mountain of Chuxiong area, recorded 103 holy trees (Liu et al. 1999).

Dai people in the Xishuangbanna area of Yunnan have a long tradition of sacred-forest conservation practices. In traditional concepts of the Dai, the "Holy Hill" (or *Nong* in the Dai language) is a forested hill where the gods reside. All the plants and animals that inhabit the Holy Hill are sacred living things in "gods garden" (Pei 1991). The Holy Hills are sacred natural forests that are important visual elements on the modern Xishuangbanna landscape, and can be found whenever one encounters a forested hill near a Dai village. The Holy Hills play an important role in the conservation of biodiversity in this area (Pei 1984; Liu 1990; Pei 1991).

Many ethnic minorities traditionally practice a combined farming system based on technical knowledge of climate, soils, water, plants and animals, encoded in the culture and language of the people; from hunting and gathering, swidden (slash and burn) cultivation, and terracing to home gardens and nomadic grazing. Ethnic minorities often respect the land as their mother and treasure what it provides as a source of livelihood and cultural worth. In Yunnan, cultures have evolved to provide means of managing the land and its natural resources in a sustainable manner, and customary laws have regulated access to and exploitation of resources for many centuries. Cultural and



Map 2. *The location of Xishuangbanna, in Yunnan Province, southwestern China*

religious beliefs, including indigenous shamanism, adaptive Buddhism, or even Catholic practices, are intrinsic to their daily life and the establishment of a harmonious existence between nature and society.

2. Ethnobotany's Contribution To Biodiversity Conservation

The maintenance of biological and cultural diversity is of global concern. Biodiversity and indigenous knowledge are interrelated. The loss of biodiversity has consequently led to the erosion of ethnobotanical knowledge within human society. On the other hand, our scientific knowledge and its methodology for biodiversity conservation are still fragmented and deficient. Sponsel (1998) pointed out that sacred places are in effect an ancient and widespread system of community-based and religiously sanctioned protected areas that promote biodiversity conservation. He suggested that government and community-based protected areas should be complementary to each other.

Ethnobotany is an interdisciplinary science for the documentation of indigenous knowledge and interactions between people and plants. Classical ethnobotany focuses documentation and description by using six axes, (Who, Where, When, How, By Whom, How Many/Much). Researchers use carefully designed methods to collect their data. However, the new orientation for ethnobotanical study should be directed towards both participatory and integrated development approaches that emphasize the community base. Applied ethnobotany should be people-centred and focus on indigenous knowledge (Pei and Xu 2003). The general principal can be summarized as follows.

1) *To work with local people by way of participatory approaches, to systematically document local knowledge of the use of plants and indigenous ecological knowledge concerning resource management in connection with local livelihoods and conservation strategies.*
2) *To not only collect specimens to be stored in herbariums, genetic resources to be stored in gene banks and ethnobotanical knowledge to be stored in databases, but also to directly apply ethnobotanical knowledge to resource management and conservation.*
3) *To analyse and understand the diversity of interactions between people and organisms, people and people, and people and knowledge, as well as the community institutions pertaining to those interactions.*
4) *To recognize that co-management systems represent a complex mixture of ecological, social, cultural and economic factors within a particular political framework, and that the reality of rural communities varies from case to case. This requires close work with local communities and the participation of local people.*
5) *To encourage the participation of local people in the collection, analysis, and revival of indigenous knowledge, as well as in the improvement of their own livelihood, and to transfer indigenous knowledge to and replicate successful practices in other places for sustainable development.*

However, the simple application of indigenous knowledge systems does not help community livelihoods in most cases. Poverty and environmental degradation dominate the eco-cultural landscape in under-developed regions. It is necessary to know how and why an approach works or not.

The potential contribution of ethnobotany to the specific context of biodiversity is suggested as follows:

1) *To document local knowledge and traditional practices in environmental and biodiversity conservation at species, genetic, and ecosystem levels.*
2) *To identify social institutions and mechanisms in traditional conservation practice and their potential application to modern conservation.*
3) *To study and examine the impact the beliefs of different cultures have on biodiversity and the natural environment and the linkage between cultural diversity and biological diversity, to contribute to modern conservation.*
4) *To facilitate community participation in biodiversity conservation and sustainable management of biodiversity resources through ethnobotanical activities and buffer-zone management schemes in protected areas.*
5) *To develop alternative conservation strategies and management practices in biodiversity conservation areas; to apply ethnobotanical concepts, methodologies, and approaches to planning, training and the implementation of conservation action projects in conservation areas.*
6) *To introduce ethnobotany into higher education systems and public-awareness educational activities, to promote conservation of nature and culture in regional communities.*

Conclusion

Western approaches to biodiversity are starting to recognize the relevance of local knowledge and community forests, but most ignore the conservation potential of sacred places because of their culture-bound modernism and scientism. (Sponsel et al. 1998)

The relationship between natural resources and people has been forged within moral, cultural, politico-economical, and ecological boundaries. The respect of these boundaries of different communities and social groups is the result of historically accepted formal and informal rules and norms (Gupta et al. 1990). A forest-oriented philosophy and religious basis of traditional life has been bred into the Xishuangbanna Dai people in Yunnan; encompassing a respect for forests, plants, and plant habitats inculcated through formal or informal norms and rules. The conservation culture of Yunnan ethnic minorities, combined with indigenous strategies for the management of natural resources for productive purposes, has succeeded in maintaining forests in this region and has very effectively managed biodiversity over a long period of time. These factors can be seen as an example of the positive impact of the interaction of human culture with the environment and the conservation of biodiversity that existed in many early societies in Asia.

The Dai people living in Yunnan have a long tradition of interactions with the natural environment. Local people have established an inter-dependent relationship with forests and plants as part of their material and spiritual lives, which has developed a sustainable use of natural resources and conserved nature in the area. Traditional natural-resource management practices are deeply rooted in their cultural traditions. It is important to maintain these cultural traditions and

traditional approaches, for biodiversity conservation in particular, and for the natural environment in general. These traditions are being lost in many regions of China today, yet the potential for the future development of the regional economy relies on local natural resources, proper resource management, and the participation of local people, which is particularly important. Ethnobotany, as a scientific subject, can play an important role in identifying traditional knowledge and practices in use, and in the protection of biodiversity within ecosystems, while facilitating community participation in local development and conservation.

References

Cunningham, A. B. 2001. *Applied Ethnobotany. People, Wild Plant Use and Conservation*. People and Plants series. London: Earthscan. Published in association with WWF International, UNESCO, and the Royal Botanic Gardens, Kew.

Ford, R. I. 1978. Ethnobotany: Historical Diversity and Synthesis. In *The Nature and Status of Ethnobotany* (No. 67 in the Anthropological Papers series). Ann Arbor: Museum of Anthropology, University of Michigan.

Gupta, A. K., and K. Ura. 1990. Blending Cultural Values: Indigenous Technology and Environment: Experience in Bhutan. Paper presented at the International Symposium on Strategies for Sustainable Mountain Development, 10–14 September, 1990, ICIMOD, Kathmandu.

Hamilton, A. 2002. Curriculum Development in Applied Ethnobotany. In *Proceedings of the Workshop on Curriculum Development in Applied Ethnobotany* edited by Zabta K. Shinri, Alan Hamilton, and Ashia Ahumand Khan, WWF-Pakistan.

Liu, A. Z., P. J. Pei, and S. Y Chen. 1999. Plant Worship of the Yi People in Chuxiong, Yunnan, China. *Ethnobotany*, vol.11: 1–8.

———. 2000. An Investigation and Study on Plant Worship in Chuxiong, Yunnan. *Chinese Biodiversity*, 8 (1): 130–136.

Liu, Hongmao. 1990. The Role of Holy Hills in Conservation of Biological Diversity of Tropical Rain Forests in Xishuangbanna Yunnan. Master's Thesis.

Martin, G. J. 1995. *Ethnobotany: A Methods Manual*. London: Chapman & Hall. Published in association with WWF-International.

Pei, S. 1985. Some Effects of the Dai People's Cultural Beliefs and Practices upon the Plant Environment of Xishuangbanna. China. In *Cultural Values and Human Ecology in Southeast Asia*, by K. L. Hutterer, A. T. Rambo, and G. Lovelace. Ann Arbor: The University of Michigan Press.

———. 1991. Conservation of Biodiversity in Temple Yards and Holy Hills by the Dai Ethnic Minorities of China. *Ethnobotany*, vol., 3.

———. 1996. Mountain Culture and Forest Resources Management of the Himalaya. In *Himalayan Ecosystem*, edited by D. W. Tewari. Dehra Dun, India: International Book Distributors.

Pei, S., and P. Luo. 2002. Mountain Culture and Biodiversity in Northwest Yunnan in China. In P*roceedings of Workshop on Curriculum Development in Applied Ethnobotany*, edited by Z. K. Shinwari, A. Hamilton, and A. A. Khan. Pakistan: WWF.

Pei, S., and J. C. Xu. 2002. Applied Ethnobotany: A Participatory Approach for Community Development and Conservation. *Chinese Journal of Ecology* 21(6).

Sponsel, L. E., P. Natadecha-Sponsel, N. Ruttanadakul, and S. Juntadach. 1998. Sacred and/or Secular Approaches to Biodiversity Conservation in Thailand. *World Views: Environment Culture, Religion* 2: 155–67.

Wang, L. S. 1988. Preservation and Development of Minority Cultures in South West China: A Case Study of Ethnobiology. In *Proceedings of the 12th International Congress of Anthropological and Ethnological Sciences.* Zagreb, Yugoslavia: Institute of Linguistics.

17. Sacred Natural Sites in Xishuangbanna, in South-Western China

by Hu Huabin

Abstract

Xishuangbanna is a unique area, with exceptional biological and cultural diversity. The majority of the ethnic minorities in this region of China have been living harmoniously with nature and practicing traditional natural-resource management for thousands of years. Holy hills and sacred groves are unique cultural features in Xishuangbanna that play an important role in the conservation of biological diversity. This paper presents an overview of sacred natural sites in Xishuangbanna, including holy-hill forests, sacred trees and groves and cemetery forests, along with a discussion on their ecological significance.

Doctor Hu Huabin is a professor with the Division of Landscape Ecology at Xishuangbanna Tropical Botanical Garden Forest Ecosystem Research Center of the Chinese Academy of Sciences, Kunming

1. Introduction

Xishuangbanna Dai Autonomous Prefecture is located south of Yunnan in southwest China (from latitude 21°09' to 22°36' north and longitude 99°58' to 101°50' east). It encompasses Jinghong, Menghai, and Mengla counties, with a total land area of 19,223 square kilometres, of which approximately 94 percent is covered by mountainous or hilly terrain. The altitude ranges from 420 to 2400 metres above sea level. The annual rainfall varies from 1200 to 1700 millimetres, about 80 percent of which occurs during the rainy season, from May to October. The average temperature is 21.5°C and relative humidity is 80 percent. It shares part of China's national boundary with Myanmar to the southwest, and with Laos to the south and southeast (Figure 1). The Lancang River (the upper course of the Mekong) crosses the prefecture from north to south.

2. Biological Diversity and Cultural Diversity

2.1 Biological Diversity

Due to its transitional geographic location and climatic conditions, traversing the tropics and subtropics, the region of Xishuangbanna possesses a rich biodiversity in which both northern and southern biota converge. Xishuangbanna covers only 0.2 percent of the land area of China, but supports nearly 16 percent of its higher plant species (Zhang and Cao 1995), and more than 23 percent of Chinese animal species can be found here. In 1958, a total area of 2,417.76 square kilometres in this

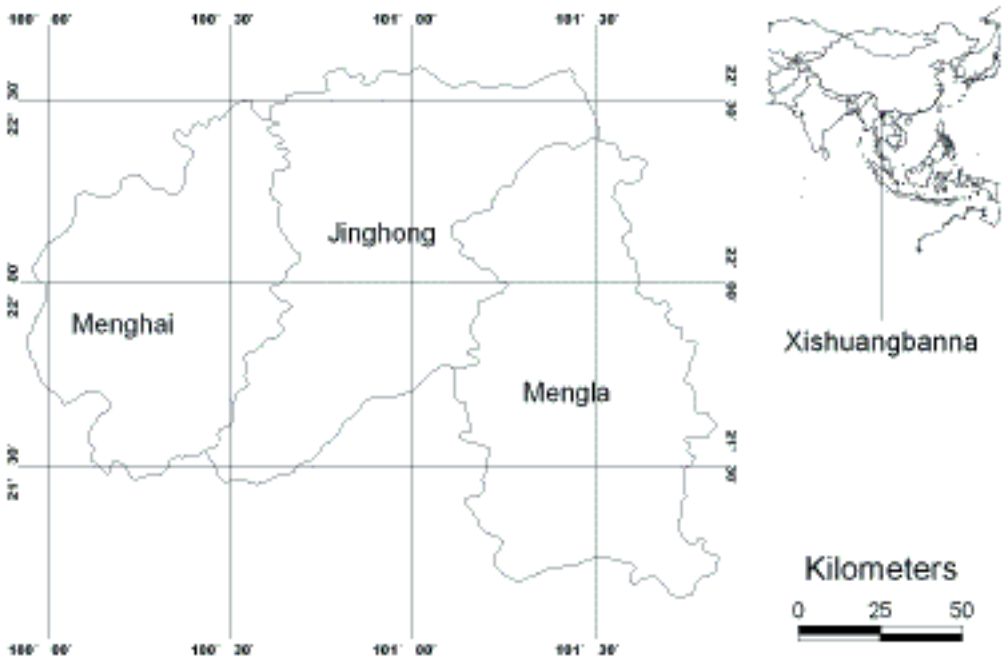
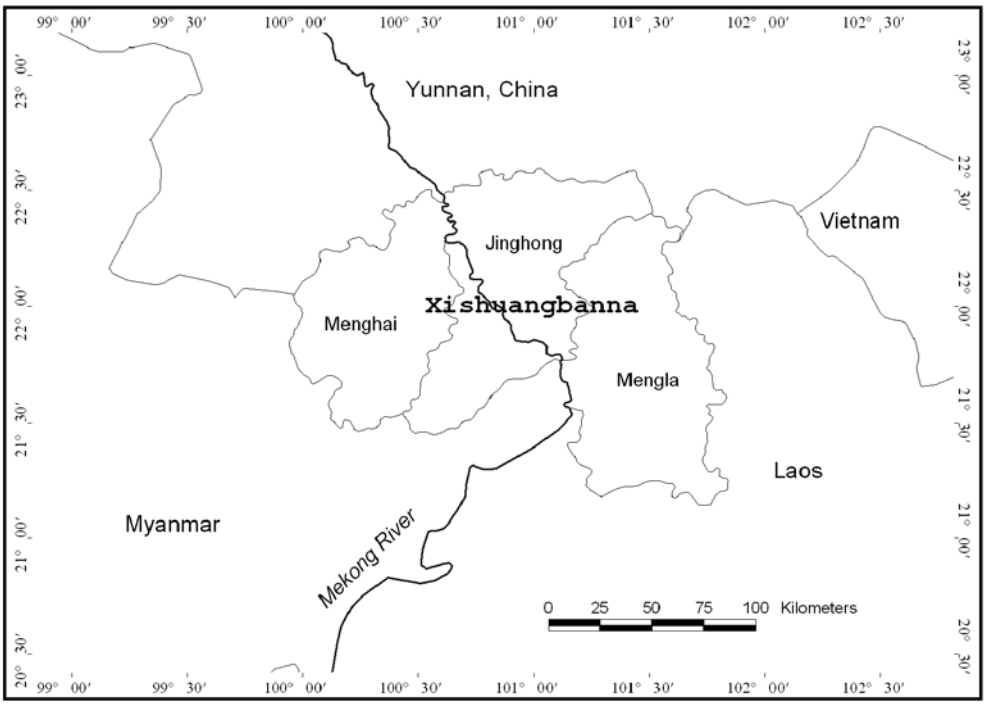


Figure 1. *Location of Xishuangbanna Dai Autonomous Prefecture, China*



prefecture was declared a nature reserve by the provincial government of Yunnan. Later, in 1993, UNESCO approved its membership to its Man and the Biosphere program. In 1991, an additional forest area of 260.67 square kilometres in this prefecture was nominated by the provincial government as the Nabanhe Nature Reserve. Consequently, 14 percent of the total land area in Xishuangbanna is classified as a nature reserve.

2.2 Cultural Diversity and Ethnoecological Knowledge

The ethnic diversity of Xishuangbanna is also noteworthy. There are thirteen ethnic minorities living in this area, accounting for about 75 percent of the 853,000 total local population in 2000. These minorities include the *Dai, Hani, Yao, Bulang, Lahu, Yi, Jinuo,* and *Wa,* as well as smaller groups. They possess a broad knowledge of biodiversity management and utilization: each ethnic minority follows its own traditions and culture and interacts harmoniously with nature.

For example, entrenched in the Dai philosophy are precepts about the intimate relationship between humanity and the environment. The Dai believe that humanity is part of a unified whole, consisting of natural elements such as mountains, forests, animals, plants, and water, and artificial elements such as buildings and afforested or cultivated land. Furthermore, the artificial elements are reflections of the natural. Of all these elements, the forest is the most important. Forests provide water through their rivers; the water then irrigates fields that feed humanity. The forest thus occupies the most important position in the hierarchy of forest – water – cultivated field – grains – humanity. Caring for the environment is regarded as a Dai virtue. As a result of prolonged Dai presence in Xishuangbanna, their perspectives on the environment have had a great influence on other indigenous peoples in the region.

Polytheistic and Buddhist beliefs are the major religions in Xishuangbanna. Buddhism has been practiced by the Dai people from the middle Tang dynasty until now, and 558 Buddhist temples and 150 pagodas can be found in the area. Evidence of polytheistic belief can also be found in Dai and other ethnic minority villages in the uplands.

3. Land-Use Patterns and Sacred Natural Sites

3.1 Land-Use Patterns

According to a recent survey in Xishuangbanna, arable land including paddy fields, dry land, and vegetable gardens, accounts for 10.9 percent of its area; land planted with rubber, tea, and tropical fruits accounts for 7.2 percent. The majority, 65.7 percent, of the total land area is covered with forests and bushes, while 13.5 percent is classified as marginal land. The remaining 2.8 percent of the land comprises grassland, roads, construction areas, and water bodies. Forests and bushes are very important to the local people and play an important role in the region.

Different ethnic groups have different land-use patterns and the degrees of dependence on the forests differs from place to place. For example, Dai people, who live mainly in the basin area,

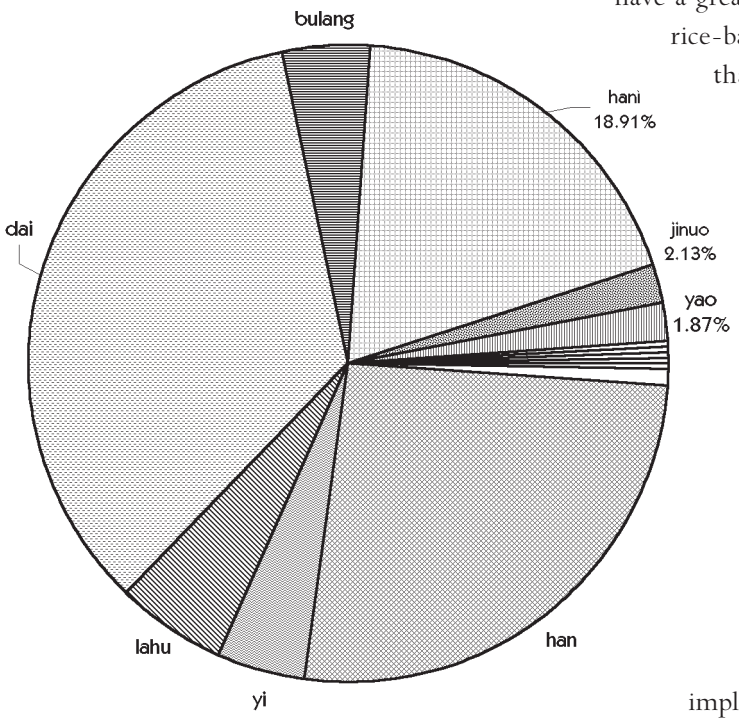


Figure 2. *Ethnic Composition of Xishuangbanna*

have a greater number of paddy fields. Their agriculture is rice-based and they have better access to the market than other minorities who live in the uplands. They also have a long history of planting *Cassia siamea* as a source of fuel wood so they do not depend on forest resources for fuel as much as other minority groups. Dai people use primarily non-timber forest products, such as mushrooms, wild vegetables and medicinal plants, which they sell in the markets.

Shifting cultivation was not a problem until the establishment of the rubber industry in this area caused massive immigration and a dramatic population increase in the 1970s. This led to severe destruction of the tropical forests in Xishuangbanna.

Since 1983, when the Land Tenure Reform was implemented, land-use patterns have been characterized by three major elements: community forests, paddy fields, and fallow land. The land allotted to each village differs. People who live in the basin area have relatively small areas of fallow land, while those living in the uplands (the Hani and Lahu, for example) were given more fallow land.

COMMUNITY FORESTS.

Their original function included watershed protection and the provision of timber, fuel wood, and non-timber products. Following the apportionment of community forests for economic reasons, farmers began to clear large areas of community forests. The wood was sold and then replaced with rubber, sugar cane, fruit trees, and tea, etc. Holy-hill forests fall into this category.

PADDY FIELDS

The main agricultural crop of Xishuangbanna farmers is usually rice. This is particularly true of the Dai people who have a history of planting double crops of rice. For economic reasons (the low price of rice and the high labour input needed) farmers often abandon the second crop. Instead, following the first rice harvest, they grow watermelon, green pepper, or other cash crops in the paddy fields to generate higher income.

FALLOW LAND.

Most fallow land is now occupied by tea, or upland rice intercropped with corn, soybean etc. Along with the rapid increase in the population, in recent years the fallow period has become shorter and the soil is subsequently less able to build up to expected fertility levels.

3.2 Sacred Natural Sites

HOLY-HILL FORESTS

The holy-hill forest symbolizes nature as the counterpart of the village. There is always a piece of natural forest located near a village. It is representative of the forest where the villagers draw their everyday needs and has to be protected in order to sustain their livelihoods and welfare. The origin of the holy-hill forests lie in animistic, pre-Buddhist beliefs.

According to the Dai, the holy spirits reside on certain holy hills. All the animals and plants inhabiting the holy-hills are considered to be either companions of the holy spirits or creatures of the holy world.

Traditionally, the holy-hill is strictly protected, its resources, including all animals, plants, and their habitats, are considered sacred. Activities such as plant collection, hunting, and land reclamation are prohibited. Violations of these codes of conduct on holy hills would anger the holy spirits, provoking them to unleash devastating retribution such as floods, fires, windstorms, earthquakes, pestilence, plagues of insects, and assaults by wild animals. Neighbouring "non-Dai" people have also tended to respect the sanctity of the holy-hills.

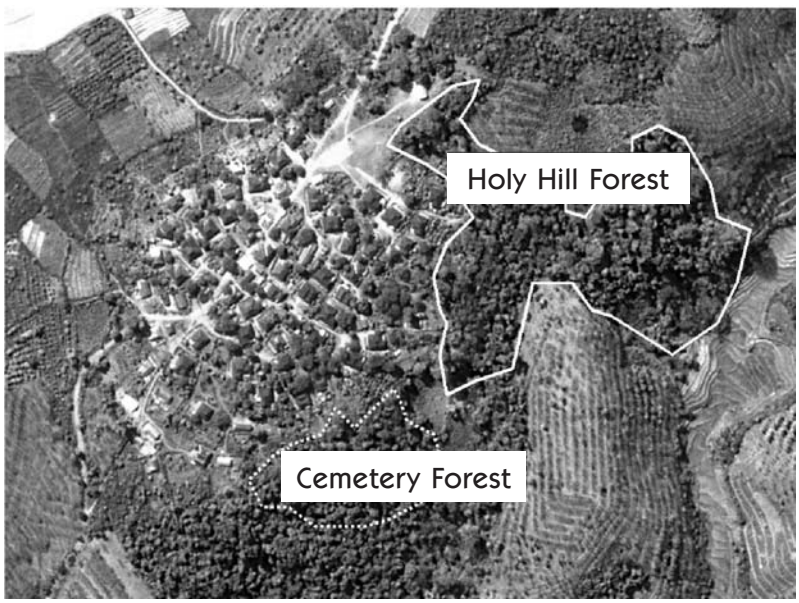


Figure 3. *The holy-hill forest and cemetery forest of Daka Village (Hani), Menglun, Xishuangbanna, China*

Thus, what may be perceived on the one hand as an aspect of spirituality is at the same time reflective of a very effective, traditional approach to environmental conservation. These holy hills appear as oases of undisturbed biodiversity among the cultivated fields and rubber plantations of the region. An investigation carried out in 1984 identified approximately four hundred existing holy hills in Xishuangbanna, accounting for a total area close to fifty thousand hectares, with only 10–15 percent of them in a pristine state. Although almost every Dai village still has its own holy-hill forest today, many are degraded and some are reduced to only a few tree groupings.

SACRED GROVES

Sacred groves are connected to Buddhism. They are usually planted forests near temples, containing many allochthonous species (*Ficus religiosa*, *Dipterocarpus turbinatus*, *Dialium ovoides*). They can also be characterized as temple forests. The origin of sacred groves can be attributed to the slash-and-burn system of agriculture, where several forest patches are left unfelled around farmlands. These groves came to be institutionalized as centres for cultural and religious life. This is one example of the prudent use of natural resources. It is extremely difficult to arrive at workable recommendations in areas such as plant quantities, quotas,

close seasons, or plant and wildlife protection in different life history stages that decisively guard against resource depletion. Providing refuges such as sacred groves may be easily perceived as one of the most efficient ways of guarding against resource depletion. Many of the sacred groves provide water for irrigation, bathing and drinking.

Buddhist thinking influences sacred groves enormously. Pei (1993) compares the sacred groves of Xishuangbanna with botanical gardens, in which rare species of plants are protected *ex situ.* Temple forests, by virtue of their size and visible locations, are comparatively more extensively studied than other forms of traditional forest management. A number of studies are available on the temple forests of India, China, Nepal and Thailand (Pei 1985, 1993). Temple forests are managed and maintained to serve the temple. This may include economic, ecological, social and religious functions.

CEMETERY FORESTS

The cemetery forest is a distinct part of the forest in which any use or activity is forbidden. The cemetery forest is always separate from the holy-hill forest and is usually lower than the location of the village settlement.

SACRED TREES

In the remoter tribal areas of the Dai ethnic group the tree cult has survived. It can be observed that *Ficus religiosa* and *Ficus altissima* are especially chosen as sacred trees. Almost every village in Xishuangbanna has sacred trees, they are the location for the performance of rituals and traditional sacrificial ceremonies. Here too, a distinction can be made between sacred trees dating back to pre-Buddhist animistic beliefs and those attributable to Buddhism. The former grow wild and are worshipped through collective rituals, whereas the latter are planted and are often worshipped in individual ritual acts. *Ficus religiosa* is usually planted as a sacred tree for family cult activities. These can often be found near the village. Small sacrifices are regularly brought to these trees. The wild sacred trees are nearly all species from the *Ficus* genus. Sacred trees symbolize specific arrays of human conditions, possibilities, and anticipation.

4. Ecological Significance

The positive effects of these sacred natural sites are primarily a side result of strict religiously motivated behaviour. Due to their restricted access, sacred natural sites are often pristine ecosystems that have survived environmental degradation precisely because they are well rooted in local cultures and traditional belief systems. The ecological effects of the holy-hill forests in Xishuangbanna are primarily due to their role in protecting floristic biodiversity. Liu and Xu (1990), in their research on five holy-hill forests, found between 105 and 122 species of plants in their 0.15-hectare survey plots. They emphasize the importance of holy-hill forests and sacred groves as stepping-stones for genetic exchange between biota. Pei (1986) refers to their significance as a watershed for adjacent rice fields and as an element of balanced, ecologically sustainable land use. In areas with little forest cover, holy-hill forests, sacred groves, and cemetery forests are important islands of biodiversity.

Sacred natural sites have played and continue to play an important role in the conservation of species and the rehabilitation of degraded environments, thereby promoting sustainable development in rural areas.

References

Liu Hongmao, Xu Zaifu, and Tao Guoda. 1990. Dai Holy Hills of Xishuangbanna and Conservation of Plant Diversity in Tropical Rain Forests. Paper presented at the 2nd International Congress of Ethnobiology, 22–26 October, 1990, Kunming, China.

Pei Shengji. 1985. Some Effects of the Dai People's Cultural Beliefs and Practices on the Plant Environment of Xishuangbanna, Yunnan Province, Southwest China. Paper no. 27 in *Cultural Values and Human Ecology in Southeast Asia* by K. L. Hutterer, A. T. Rambo and G. Lovelace, eds. Ann. Arbor: University of Michigan, 321–339.

Pei Shengji. 1985. Some Effects of the Dai People's Cultural Beliefs and Practices on the Plant Environment of Xishuangbanna, Yunnan Province, Southwest China. Paper no. 27 in *Cultural Values and Human Ecology in Southeast Asia,* by K. L. Hutterer, A. T. Rambo, and G. Lovelace, eds. Ann. Arbor: The University of Michigan Press, 321–339.

————. 1986. Tropical Forests and Upper Watershed Management. Paper presented at the Workshop on Ecological Principles for Watershed Management, held at the East-West Center, Honolulu, Hawaii, 1986.

————. 1993. Managing for Biological Diversity Conservation in Temple Yards and Holy Hills: the Traditional Practices of the Xishuangbanna Dai Community, Southwest China. In *Ethics, Religion and Biodiversity: Relations between Conservation and Cultural Values,* edited by L.A. Hamilton. Isle of Harris, U.K.: The White House Press, 118–132.

Zhang, J.H. and M. Cao. 1995. Tropical Forest Vegetation of Xishuangbanna, South West China, and its Secondary Changes, with Special Reference to Some Problems in Local Nature Conservation. *Biological Conservation*. 73: 229–238.

18. Conserving Plant Diversity through Traditional Beliefs in Xishuangbanna, Southwest China

by Liu Hongmao, Xu Zaifu, Xu Youkai, and Wang Jinxiu,

Professor Liu Hongmao is Director and Professor Xu Zaifu Emeritus Director at Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Yunnan, China.

Mr Xu Youkai and Mr. Wang Jinxiu are research associates at Xishuangbanna Tropical Botanical Garden

Abstract

Developing various strategies for global biodiversity conservation is important for today's critically degraded environment, and there is a growing recognition that the effective conservation of biodiversity will depend on the long-term participation and understanding of local communities. In order to establish the connection between traditional beliefs and the conservation of biodiversity, a case study was carried out in Xishuangbanna, one of the richest areas for biodiversity in China.

The Dai, a dominant ethnic group in Xishuangbanna, follow both Polytheistic and Buddhist beliefs, which have close relationships with plant diversity. This paper recommends the following approaches for the conservation of plant diversity by the application of traditional beliefs:

1) *Depending on the religious belief system, establishing an "Association of Religious Plant Conservation" to organize local people to participate in conservation by means of religious activities; to document the indigenous botanical knowledge and to train local people*
2) *Training local people at different levels to improve their capacity in the conservation of plant diversity, with science and religion working together*
3) *Demonstrating the conservation of plant diversity by rehabilitating the holy hill forests and plants in temple gardens.*

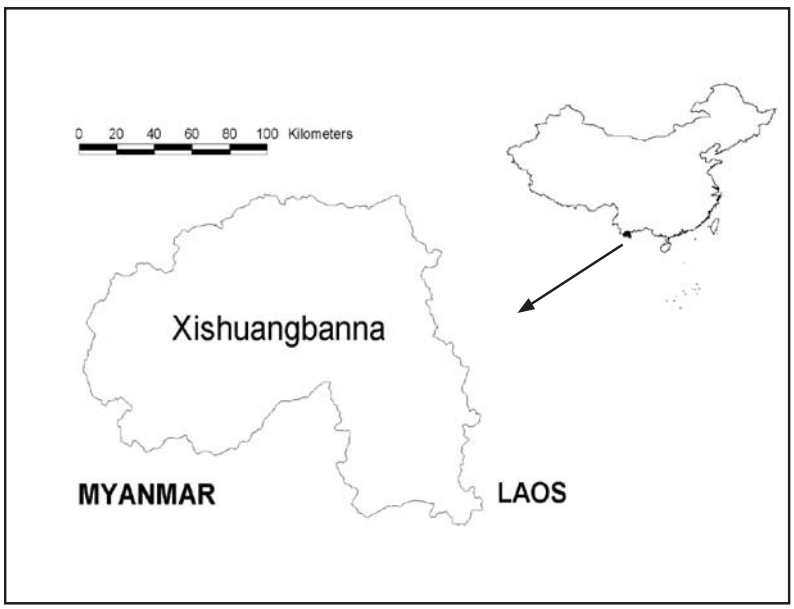
Introduction

Exponential human population growth in the last few centuries has greatly affected the natural world, to the extent that the massive alteration of habitats and associated biological change threaten the existence of millions of species and basic ecosystem processes. Developing various strategies for global biodiversity conservation is important for today's critically degraded environments.

Cultural diversity enjoys a close relationship with biodiversity, and its importance for biodiversity conservation has received increasing attention (Gadgil et al 1993; Berkes 1995; Dasman 1995; McNeely 1995; Arizpe 1996; Furze et al 1996; Liu 1996; Sinha 1996; Augustine 1999). For example, the Convention on Biological Diversity calls on parties to "respect, preserve, and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity, and promote their wider application

with the approval and involvement of the holders of such knowledge, innovations and practices, and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices" (Article 8j). Religious beliefs are the important components of culture, and all of the world's major religions are sensitive to the importance of biodiversity and the natural environment (Hamilton 1993; Puspa 1996; David et al 1998; McNeely 2000). This paper reports the approach of conserving plant diversity through traditional beliefs in Xishuangbanna, Southwest of China, based on the research of the relationship between the Dai people's traditional beliefs and plant diversity from 1993 to 1999.

Figure 1, *Location of Xishuangbanna*



Xishuangbanna is located in the south of Yunnan Province, in southwest China (from latitude 21°09' to 22°36' north and longitude 99°58' to 101°50' east). It borders Laos in the south and southeast and Myonmar in the southwest (Figure 1). The total area spans 19,220 square kilometres, approximately 94 percent of which is covered by mountains and hill terrain. The altitude varies greatly from 430 to 2,300 metres. Annual rainfall varies from 1,200 to 1,700 millimetres, of which 80 percent falls during the rainy season from May to October. The average temperature is about 21.5°C with relative humidity around 80 percent. Benefiting from the unique location and subject to diverse climates, the area is rich in plant diversity with around 5,000 species of vascular plants (18 percent of China's flora) in an area covering only 0.2% of the total land surface of China. However, with the expansion of the population and the development of cash crops such as rubber, tea, and tropical fruits, the coverage of the tropical forest has been reduced from 60 percent in the 1950s to around 30 percent in the 1990s, resulting in loss of about 600 plant species (Xu 1988). A great deal of attention has been given to the conservation of biodiversity in the area, such as the establishment of a national nature reserve with an area covering 240 square kilometres, occupying 12 percent of the total area (Xu 1985).

Xishuangbanna is a Dai autonomous region inhabited by thirteen nationalities: among these are the Dai, Hani, Jinuo, and Yao. The population of the Dai people is 280,000, or one-third of the total population of the area. The Dai people have the same origin and historical background as other nationalities in nearby countries such as Thailand, Vietnam, Laos, and Myonmar (Gao 1992). The population of these peoples in these countries is over 2,000,000, 890,000, 1,800,000 and 2,500,000 respectively (Wang 1990).

Dai Religious Beliefs and Plant Diversity

The Dai people in Xishuangbanna have both Polytheistic and Buddhist beliefs, which have blended and have shared traditions. The ancestors of the Dai people practised polytheistic religion before Buddhist religion was introduced to the area during the middle of the Tang dynasty (Dao 1992). Buddhism is the predominate belief in Dai society. Both polytheistic religion and Buddhism have close relationships with plant diversity and have thus played an important role in the conservation of plant diversity (Pei 1985; Liu et al 1992; 1996; Xu 1995).

The Role of Holy Hill Forests in the Conservation of Plant Diversity

Holy hill forests can be traced to the Dai's polytheistic beliefs. The Dai believe that the holy hill is a place where gods reside and where all plants and animals in the forest are protected by the gods — any damage or disturbance of the plants and animals in the forest is punishable by the gods. As a result, hunting, gathering and cutting are strictly prohibited in holy hill forests. Currently, there are about 250 holy hills in Xishuangbanna, occupying 1000–1500 hectares of land. Traditionally, each village had a holy hill forest.

Twenty-eight holy hill forests were investigated for the present study. All plant species found at these sites were investigated and identified. Four sample plots, fifty metres by fifty metres in size, were established in four holy hill forests. Within each sample, five smaller quadrates, ten metres by ten metres in size, were selected at random. All trees and shrubs with a trunk or stem diameter at breast height (DBH) of at least five centimetres were investigated in sample and quadrates respectively.

The Shannon-Wiener index was used for the comparison of plant-species diversity. The results show that most holy hills are distributed among regions below nine hundred metres above sea level, where the vegetation types are mainly dry evergreen seasonal rainforest and semi-evergreen seasonal rainforest. In comparison, there are hardly any of these vegetation types in other places, even in national nature reserves, because of the expansion of economic plantations (Xu 1985; Wu 1987). A total of 268 plant species belonging to 92 families were found in the 28 holy hill forests investigated. Fifteen of these plants are protected species listed in the *China Plant Red Data* list. These include *Magnolia henryi, Homalium laoticum,* and *Antiaris toxicaria,* and amount to 30 percent of total protected plant species. The plant species diversity index in holy hills is very similar to that of nature reserves (see Table 1). Therefore, holy hills can effectively be considered as small nature reserves established by Dai traditional beliefs.

Buddhism and Conservation of Plant Diversity

Buddhism was introduced into Xishuangbanna during the Tang Dynasty. The temple is a place for practicing religious activities. The tenets of Buddhism specify that the following four requirements must be met before a temple can be erected: a portrait of Sakyamuni; a pagoda; more than five

monks and the presence of specific plants related to Buddhism. Every village has its own temple; there are currently 558 temples in Xishuangbanna. In Xishuangbanna, 51 temple gardens were surveyed for plant species by means of Participating Rapid Assessment (PRA) in cooperation with local people, including clerics and older farmers. The use of these plants for religious purposes was also investigated. In addition, religious documents were collected in order to identify the use of plants in religion. The results show that over one hundred plant species were cultivated in temple gardens. These can be divided into three groups (Pei 1985, Xu 1995): ritual plants including Buddha trees; other plants related to Buddhism such as *Alstonia scholaris, Ficus racemosa,* and *Ficus religiosa*; and the leaves of the *Corypha umbraculifera.* These were all used to carve Buddhist Sutras (over fifty thousand examples of Buddhist Sutra are protected in Xishuangbanna. The wood of *Tectona grandis*, *Artocarpus heterophylla* and *Gmelina arborea* were used for making the statues. The oil extracted from the seeds of *Mesua ferrea* and *Aleurites moluccana* was used to illuminate the temple. Plant offerings include flowering plants such as *Nympaea lotus*, *Hedychium chrysoleucum, Crinum asiaticum* and tropical fruits such as *Anona reticulata*, *Citrus grandis*, and *Mangiera indica*, which are normally used as offerings at Buddhist ceremonies and are also served as daily food for temple monks. Ornamental plants such as *Butea monosperma*, *Cassia fistula*, and *Michelia alba* play a role in beautifying the temple and the village. All plants mentioned above are protected by religious regulations. As with botanical gardens, temple gardens have played a significant role in the *ex-situ* conservation of plant species. Moreover, many species planted in villages originate from the temple gardens (Yu 1985). Therefore, they could be called "Temple-Botanical Gardens".

Table 1. *Plant diversity in demonstrated holy hills*

	Index of Species Diversity	
	Before the Project	After the Project
Holy Hill 1	3.78	4.16
Holy Hill 2	4.12	4.29
Holy Hill 3	3.56	4.12
Holy Hill 4	4.01	4.22
Nature Reserve	4.63	

Approaches to Conserve Plant Diversity through Traditional Beliefs

Establishing the Association of Religious Plant Conservation

As mentioned previously, the Dai people believe in both Polytheism and Buddhism, and their traditional beliefs are very closely related to plant diversity. However, despite this, there is no organized integration of traditional knowledge with plant diversity management. The Association of Religious Plant Conservation was established to enhance the role of traditional beliefs in plant conservation. It is a non-governmental organization attached to the Religious Association of Xishuangbanna.

The mandate of the association is multifold: to document and understand traditional botanical knowledge; to train and educate people, especially the younger generation; and to encourage local people to use their traditional knowledge in the conservation of biodiversity and the environment. Anyone who respects traditional beliefs and plant conservation and the environment can be members of the association. The association's headquarters includes a documentation section, an education section and three branches, located in the general temple of Xishuangbanna and regional temples respectively. The association has played an important role in training and organizing local people to participate in the conservation of plant diversity.

Training Local People

The temple is not the only place where people practice religious activities, but it is also a school for learning traditional knowledge. Traditionally, young Dai men reside in the temple for some years and are taught the fundamentals of traditional knowledge. Presently there are 558 temples in Xishuangbanna housing about five and one half thousand young men. Since the founding of the association in 1998, and in cooperation with botanists, thirty-two training courses have been run. They can been divided into three levels: first-level courses are held in the Xishuangbanna general temple to train students of the Buddhism College and the heads of regional religions, second-level courses are held in regional temples to train the heads of village clerics and farmers, and third-level courses are held in village temples to train local clerics and farmers. To date, 1320 people, including clerics, farmers and local officers, have been trained here. Training involves studying traditional beliefs and plant diversity as well as techniques for identifying and managing plants with respect to traditional beliefs.

Recovering Plant Diversity in Holy Hills and Temple Gardens

Traditionally, holy hill forests and plants in temple gardens were well protected. However, in the 1960s and 1970s, many holy hill forests and temples were destroyed. Even well-maintained holy hills and temple gardens were partly superseded by cash crops. But since the 1980s, many temples and holy hills have been rebuilt, although the plants they contain have not been recovered. Based on training and education, four holy hills and six temple gardens in different regions were selected as demonstration sites for the recovery of plant diversity. Organized by the Association of Religious Plant Conservation, more than five hundred people have participated in demonstration activities, and plant diversity in temple gardens and holy hills has recovered well (see Table 1).

The number of plant species in six temple gardens has increased to ninety-one species, and most ritual plants have been recovered (see Table 2 below).

The recovery of plant diversity not only helps in the conservation of traditional culture but also beautifies the environment, which is helpful to the development of ethnic-ecotourism. Many other villagers, not only those at the demonstration sites, have learned techniques for plant diversity recovery in their holy hills and temple gardens.

Scientific Name	Use in Buddhism
Alstonia scholaris	Buddha tree
Termienalia brlliriica	Buddha tree
Dolichandrone caudafelia	Buddha tree
Securinega virosa	Buddha tree
Ficus racemosa	Buddha tree
F. altissima	Buddha tree
F. religiosa	Buddha tree
Mallotus barbatus	Buddha tree
Oroxylum indicum	Buddha tree
Cinamomum sp.	Buddha tree
Bambusa ainospinosa	Buddha tree
Tectona grandis	Buddha tree
Michelia champaca	Buddha tree
Gmelina arborea	Buddha tree
Celtis cinnimomum	Buddha tree
Dialium ovoides	Buddha tree
Dolichandrone caudafelina	Buddha tree
Musella lasiocarpa	Buddha tree
Macaranga denticulate	Buddha tree
Mesua ferrea	Buddha tree and the seed oil used for lighting the temple
Gossampinus malarica	Buddha tree
Saraca dives.	Memorial tree for Sykamuni's birth
Shorea assamica.	Memorial tree for Sykamuni's death
Corypha umbraclifera	The leave used for carving Buddha Sutra
Chukrassia tabularis	Wood used for construction of temple
Paramichelia bailonii	Wood used for construction of temple

Table 2. *Ritual plants in temple gardens*

Table 2 (cont.)
Ritual plants in temple gardens

Scientific Name	Use in Buddhism
Artocarpus heterophylla	Wood used for carving Buddha statuary
Aleurites moluccana	Seed oil used for lighting the temple
Cinnamomum comphora	Cooked water with the wood used for washing Buddha statuary
C. ponectum	Cooked water with the wood used for washing Buddha statuary
C. glanduliferum	Cooked water with the wood used for washing Buddha statuary
Syzygium jambos	Cooked water with the parts of the plant used for washing monks when he is promoted
Acacia pennata	Cooked water with the parts of the plant used for washing monks when he is promoted
Bixa orellana	Used for dying the offering foods
Morinda angustifolia	Used for dying monks' clothes
Gardenia jasminoides	Used for dying monks' clothes
Nymphaea tetragona	Offering flower
Cirnum asiaticum	Offering flower
Hedychium coronerrium	Offering flower
Plumeria rubra	Offering flower

Conclusion

Human cultural diversity shares a close relationship with biodiversity and the environment. Traditional societies have often protected parts of their natural landscape or left intact a number of its elements. Most of these societies consider certain sites to be sacred, where most or all human activities are prohibited. The holy hill forest and religious plants are good examples of the important role traditional culture plays in the conservation of biodiversity. Establishing the connection between specific cultural practices and conservation, or enhancement of biodiversity, is no by means a simple matter, however the results show that biodiversity conservation based on cultural and religious values is often much more sustainable than that based on legislation or regulation alone. Indigenous people are often knowledgeable about biodiversity (Redford et al 1992), but indigenous knowledge was formulated under conditions arising from a limited population, large forest coverage, and high biodiversity. It is when confronted with market pressures, higher population densities, new technologies, and increased opportunities that we recognize that the wide use of indigenous knowledge in biodiversity conservation is obviously far from being acquired.

Acknowledgements

Thanks are due to the For Foundation for its support for this project and to Dr. Palmer of The Alliance of Religions and Conservation for his helpful comments.

References

Hellier, A. and A. Newton. 1999. Use of Indigenous Knowledge for Rapidly Assessing Trends in Biodiversity: A Case Study from Chiapas, Mexico. *Biodiversity and Conservation* vol. 8 (7): 869–889.

Arizpe, L. 1996. Culture and Environment. *Nature & Resources* 32 (1): 1.

Berkes, F. 1995. Indigenous Knowledge and Resource Management Systems: A Case Study from James Bay. In *Property Right and Design Application*, edited by S. Hanna and M. Munasinghe, 99–110.

Dao Guodong. 1992. *An Informal Discussion on the Historical Culture of Dai*. Beijing: The Minority People's Press.

Dasman, R. F. 1995. The Importance of Culture and Biological Diversity. In *Biodiversity: Culture, Conservation and Ecodevelopment,* edited by M. Oldfield and J. Alcorn. Boulder, Colorado: Westview Press, 9–15.

Cooper, D. E. and J. A. Palmer, eds. 1998. *Spirit of the Environment: Religion, Value and Environmental Concern.* London and New York: Routledge.

Furze, B., T. De Lacy, and J. Brickhead. 1996. *Culture, Conservation and Biodiversity*. .New York: John Wiley & Sons.

Gao Lishi. 1992. *The History and Culture of Dai in Xishuangbanna*. Kunming, China: Yunnan Minority Press.

Gadgil, M., F. Berkes and C. Folke. 1993. Indigenous Knowledge for Biodiversity Conservation. *Ambio* 22: 151–156.

Hamilton, L. S. 1993. *Ethics, Religion and Biodiversity*. Cambridge, England: The White Horse Press.

Liu Dewang. 1996. Religion: An Effective Way to Conserve Wildlife. *Chinese Biodiversity* 4 (2): 123–124.

Liu Hongmao, Xu Zaifu, and Tao Guoda. 1992. The Ecological Significance of Dai Holy Hill Forests. *Chinese Journal of Ecology*, 1992 (2): 41–45.

———. 1996. Xishuangbanna Dai's Holy Hills and the Conservation of Plant Species of Tropical Rainforests. In *The Challenges of Ethnobiology in the 21st Century,* edited by Pei Shengji. Kunming, Yunnan, China: Yunnan Science and Technology Press, 327–330.

McNeely, J. A. 1995. The Interaction between Biological Diversity and Cultural Diversity. Paper presented at the International Conference on Indigenous People, Environment and Development held in Zurich, 15–18 May.

———. 2000. Cultural Factors in Conserving Biodiversity. In *Links between Culture and Biodiversity,* edited by J. C. Xu. Kunming, China: Yunnan Science and Technology Press, 128–142.

Pei Shengji. 1985. Some Effects of the Dai People's Cultural Beliefs and Practices on the Plant Environment of Xishuangbanna, Yunnan Province, Southwest China. Paper no. 27 in *Cultural Values and Human Ecology in Southeast Asia.* Edited by K. L. Hutterer, T. Rambo, and G. Lovelace. Ann Arbor: The University of Michigan Press, 321–339.

Puspa Gogoi. 1996. Plants Used in Religious Beliefs of the Tai Khamtis. In *Proceedings of the Second International Congress of Ethnobiology*, edited by Pei Shengji. Kunming, China: Yunnan Science and Technology Press.

Redford, K. and C. Padoch. 1992. *Conservation of Neotropical Forests*. New York: Columbia University Press.

Sinha, R. K. 1996. Conservation of Cultural Diversity of Indigenous People Essential for Protection of Biological Diversity. In *Ethnobotany in Human Welfare*, edited by S. K. Jain. New Delhi: Deep Publications 280–283.

Wang Yizhi. 1990. *Review on the History of Hinayana Buddism of Xishuangbanna in the Theory of Palm Leaves Buddhism Sutra*. China: Yunnan People's Press.

Wu Zhengyi. 1987. *The Vegetation of Yunnan*. Beijing, China: Science Press.

Xu Yongchun and Jiang Hanqiao. 1985. *The Investigation Report of Nature Reserves in Xishuangbanna*. Kunming, Yunnan, China: Scientific and Technological Press of Yunnan.

Xu Zaifu. 1988. The Conservation and Utilization of Plant Resources in the Tropics of Yunnan. Supplement in *Botanica Yunnan* 1:113–124

Xu Zaifu and Liu Hongmao. 1995. Palm Leaves Buddhism Sutra Culture of Dai and the Conservation of Plant Diversity in Xishuangbanna. *Biodiversity* 3: 23–31.

Yu Pinghua, 1985. The Study on Traditional Cultivated Plants in Dai Villages of Xishuangbanna. *Acta Botanica Yunnanica*, 7 (2): 169–186.

19. Local Knowledge and Dryland Management in Xinjiang, Northwest China

by Liu Wenjiang

1. The Arid Environment of Xinjiang

1.1 Geography

Located in China's northwest, Xinjiang borders Gansu and Qinghai provinces in the east and the Tibet Autonomous Region (TAR) in the south. Internationally, it borders Mongolia, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, and Kashmir. Its frontier covers 5,400 kilometers, or one-quarter of China's total borders. Xinjiang is situated between 73°40' and 96°23' east longitude and 34°25' and 49°10' north latitude, in the heart of the Eurasian continent. With an area of 1.66 million square kilometres, it makes up one-sixth of China's total land surface; it is the largest of the country's provinces and autonomous regions. Once an important route on the famous Silk Road, linking east and west, today Xinjiang has become an important section of the modern Eurasian Continental Bridge.

Professor Liu Wenjiang is an Associate Professor at the Xinjiang Institute of Ecology and Geography of the Chinese Academy of Sciences

1.2 Topography

Xinjiang is noted for its topography, with two basins surrounded by three mountain ranges. The verdant, majestic Altai Mountains provide a slanting defense from the northeast; the lofty, precipitous Kunlun and Karakorum Mountains wind around the south; and the broad Tianshan Mountains span the middle of Xinjiang from the west to east, naturally dividing the region into two parts, southern Xinjiang and northern Xinjiang, forming the Tarim Basin in the south and Junggar Basin in the north.

1.3 Climate

Its distant location from any ocean and its enclosure by high mountains, which prevent the entrance of any moist air from the sea, mean that Xinjiang has a typically continental climate characterized by variability, dry air, lack of rainfall, and long sunshine hours. The annual average precipitation is 10–100 millimetres in the basin, 250–530 millimetres in the mountains. Evaporation in southern Xinjiang is 1000–1550 millimetres and 1000–1200 millimetres in northern Xinjiang.

The complicated geography and topography of Xinjiang and its extreme climate form its unique arid and semi-arid environment. In Xinjiang there is a vast expanse of desert, comprising nearly two-thirds of all of China's desert area. Taklimakan Desert in the Tarim Basin is the second-largest shifting desert in the world, covering an area of 320,000 square kilometres. Gurbantunggut Desert in the Junggar Basin, covering some 48,000 square kilometres, is China's second-largest desert.

In addition there is the Gobi Desert, which is made up of naked rock, mountains, snow, and ice and cannot be exploited by humans. These lands account for over 50 percent of the total area of China. This harsh environment explains the positioning of human settlements in the natural pastures of the mountainous areas and in the scattered oases bordering the many rivers. Land used for farmland and for residential purposes accounts for only 3.6 percent of Xinjiang's total area.

2. Nationalities and Cultures in Xinjiang

Xinjiang is called the "Museum of world nationalities" and the "Museum of world religions" for its long history, mixture of minorities, and deep cultural associations. Xinjiang is a multi-nationality region and the home of forty-seven nationalities. Many of these groups have lived here for many generations.Its thirteen principle nationalities are: Uygur (46 percent in 2001), Han, Kazak, Hui, Mongol, Kirgiz, Tajik, Xibe, Ozbek, Manchu, Daur, Tatar, and Russian.

The famous "Silk Road" provided unlimited opportunities and unprecedented convenience for the exchange of material goods and spiritual civilization between the West and East. China's ancient Western Region (now Xinjiang), as the main section and hub of this passage, became an important trading center for world trade and a bridge of exchange between the East and the West thanks to its advantaged location. The flow and mix of people, the inter-exchange of nationalities both local and exotic, was responsible for the combination and mix of multi-dimensional cultures that formed the art of the Western Region.

The nationalities of the region have long-standing histories and cultures. Most of them have their own languages and alphabet (although some languages are commonly used by several groups), religions, and customs. The habitants engage in a wide range of economic activities, depending on the nature of their diverse surroundings and traditions. Religions include Islam, Lamaism (Tibetan Buddhism), Buddhism, Taoism, Christianity, Catholicism, Eastern Orthodox Christianity, and Shamanism. Those who have faith in Islam are the Uygurs, Kazaks, Huis, Kirgizes, Tajiks, Ozbeks, Tatars, Salars, Dongxiangs, and Bonans. Islam is therefore a religion of considerable influence in the social life of Xinjiang.

The versatile nature of the region as regards religious faith, nationality, economy, language. and alphabet adds significantly to its social diversity and multi-layered culture, and forms a striking contrast to the coastal and middle parts of China.

3. Local Knowledge

The Uygurs (meaning unity or association) constitute the principal ethnic group in Xinjiang and are found scattered throughout Xinjiang. Uygur minorities mainly reside in the areas surrounding the Tarim Basin and in certain oases in the Junggar Basin. Hotan, Kashgar, Akesu, Turpan, and Hami prefectures have dense Uygur populations.

The Uygurs have a long history and unique art and culture. Folk literature is abundant and diverse. The "Twelve Mukam" is a musical dance created by the Uygur people in ancient times. Uygur dancing is skillful and graceful, known for its swift movements and numerous changes. "Sainam" is the most popular folk form of dancing. The dance movements are lively and humorous, reflecting the optimism and cheerfulness of the Uygur people.

The Uygurs are engaged mainly in agricultural production and animal husbandry, though they are adept at horticulture and art. For example, traditional Uygur handicrafts are proving quite profitable and demonstrate a very high artistic level. Handicraft industries include carpets and hanging rugs of various designs, unique silk garments and embroidery, exquisitely made caps, copper kettles, knives, folk musical instruments, and decorations of over forty descriptions and more than a hundred varieties, each made with fine craftsmanship and demonstrating unique national features.

3.1 Traditional Medicine

With sustained experience in exploiting the region's limited natural resources, improving the arid environment, and establishing oases and developing irrigation agriculture, the Uygurs have learnt to understand their environment, and have accumulated valuable experience in the use of plants, animals, and minerals for disease control. As a result, they have formed their own unique Uygur Medicine System, which differs from Chinese Traditional Medicine, Tibetan Medicine, and Mongolian Medicine.

3.2 Water Resources

Since ancient times, Uygurs have prized food and regarded water as the source of that food. Water is essential for their existence because of the extreme arid environment in which they live, which explains why Uygurs worship water and are very protective over it, even its sources. Uygurs never pollute water but instead they highlight its purity; to dream of swimming was considered a good omen.

In Turpan Basin, because of the higher temperatures, the local people created the "Karez", an underground irrigation system that, with the Yellow River and the Great Wall is one of China's "Top 3 Engineering" stuctures. It reduces evaporation and maintains water purity, ensuring that Turpan is abundant and prosperous.

3.3 Tree Worship

Uygurs have long understood the importance of trees: the tree is considered the main protector of the environment and they have developed a custom of tree protection and propagation.

The first Forest Regulation of China, founded in the Loulan Ancient Kingdom of Xinjiang, was written in ancient language in the third Century AD. It stated that tree cutting was forbidden, or else a horse had to be forfeited; if a tree was cut during its growing season, then cattle was forfeited.

There are also many proverbs, folk poems, legends, and historic works referring to forest protection and afforestation, such as; “cut one tree and planting ten trees”, “the forest is a reservoir, it can not only store surplus but also release water”, “more forest, more water — harvest during drought”. Furthermore, Uygurs have a tradition whereby they plant trees around their house when they first settle in their homes, considered to afford them protection. Uygurs also worship ancient and old trees, which symbolize rainfall and peace; consequently many ancient and old trees tend to be well-preserved in Xinjiang.

3.4 Desert Control

Desertification is the most serious environmental issue in the Tarim Basin today. In order to effectively combat desertification, the local people have rediscovered and employ many practical and successful indigenous measures and traditions to control desert encroachment, and this knowledge is still used today. Examples of traditional techniques are briefly described below:

- *Setting windbreaks during the drought months by planting grass and trees that have the effect of fixing the sand and controlling the wind.*
- *Shifting sand using water and levelling sand for farmland has proved to be practical and effective; irrigating the sand saves on labour and transforms the arid landscape.*
- *Constructing a wall at the desert fringe that is then consolidated by planting trees behind the wall; the wall acts as a barrier, and as it erodes it provides nutriment to the trees.*
- *Creating shelterbelts or shrub-grass belts by constructing a fence of shrubs and trees that act as a barrier against the wind and helps stabilize the dunes.*
- *Surplus water during the flood season can be used for irrigation, which improves the soil and increases the crop yield.*

Valuable indigenous knowledge plays a significant role in desertification control and agricultural production, as well as in local environmental restoration and construction. As well as the Tarim Basin and Xinjiang, this indigenous knowledge can be applied to regions in Northwest China and similar arid regions worldwide.

20. Sacred Sites in Northwest Yunnan, China

by Luo Peng, Wu Ning, Yan Zhaoli, and Pei Shengji

Abstract

At a time when ecological degradation and loss of biodiversity have been taking place at an alarming rate, a large number of plant communities and species can be seen to be preserved in various sacred sites in Northwest Yunnan; portions of landscape formed and traditionally protected for cultural belief purposes. The religious context of these plots is very rich and complex. These sacred sites, scattered throughout the region, are classified into three types: sacred forests, temple sacred sites, and sacred mountains. Different types of sacred sites of various sizes, shapes, habitats, and isolation constitute a culture-based natural-reserve system — a sacred-site reserve system. As an important part of vernacular conservation, and a useful complement to modern preservation frameworks, this system has played a very active role in environmental and biodiversity protection at both community and regional levels. Examples of the cultural background, distribution, ecological value, and other properties of the three types of sacred sites are given and analyzed in this paper. Finally, the necessity of integrating this system into modern development projects and its potential uses in ecological rehabilitation and biodiversity management in rural areas are suggested.

Dr. Luo Peng is an Associate Professor at the Center for Ecological Studies of the Chengdu Institute of Biology of the Chinese Academy of Sciences. Dr. Wu Ning is a professor and Ms. Yan Zhaoli is a researcher and development practitioner at the Chengdu Institute of Biology of the Chinese Academy of Sciences.

Professor Pei Shengji is Director of the Department of Ethnobotany at the Kunming Institute of Botany of the Chinese Academy of Sciences, Kunming, China

1. Background

Northwest Yunnan is a well-known mountainous region and one of the twenty most important key regions for biodiversity conservation in China (State Environment Protection Bureau 1998). It belongs to the Hengduan Mountain area (one of the twenty biodiversity hotspots in the world, see Olivieri et al 1998) and is situated in the transitional zone between the Qinghai-Tibet Plateau and the Yunnan-Guizhou Plateau. It houses over seven thousand species of vascular plants and at least seven hundred terrestrial vertebrates. The topography is extremely rugged, with snow-capped mountains and deep gorges. From the summit of the sacred Khabadkapo (6,740 metres) to the lowest place in Nujiang Valley (500 metres), the elevation difference is over six thousand metres. It is recognized as an important part of the Hengduan Mountains and is the only hotspot situated in the northern hemisphere. It is also a key headwater region for four major rivers in China and Southeast Asia: the Yangtze (Jinsha River), the Mekong (Lancang River), the Salween (Nujiang River), and the Irrawaddy (Dulong River), which run in parallel courses within the narrow mountain ranges.

Biodiversity conservation in Northwest Yunnan is therefore not only important in China, but of great significance for the world.

Northwest Yunnan is also a typical minority ethnic region in China. With an area of 72,531 square kilometres, it is inhabited by seventeen ethnic groups, including Bai, Yi, Tibetan, Lisu, Naxi, Nu, Dulong, Pumi, and Muslim. With much of the population still living below the country's poverty line, the ethnic groups vary greatly in their economic and social development. Various production systems, including collection, hunting, shift agriculture, nomadic pastoralism, and modern agriculture and industry are simultaneously practiced in the region, displaying a wide cultural diversity. It is also a region rich in cultural beliefs, which include not only the major theological religions Buddhism, Islam, and Christianity but also a range of animist beliefs. As one of the most important elements of traditional cultures, these religious beliefs have actively influenced the mountain people's behaviour, social institutions, and biodiversity management of the past and present.

In the last few decades, and as experienced in many other regions of the world, Northwest Yunnan has undergone extensive environmental degradation. Since the 1970s, widespread deforestation in Northwest Yunnan has resulted in the loss of wildlife and the habitats of endangered species in the region, as well as soil erosion and landslides. For example, a total area of 7,595 square kilometres in Diqing prefecture (mainly on steep slopes following logging and then farming) is subject to soil erosion. In the 1960s, sediment amounted to 0.568 kg/m^3 in Jinsha River (upstream of Yangtzi) and 1.19 kg/m^3 in Lancang (Mekong) River, increasing to 0.61 kg/m^3 and 1.24 kg/m^3 respectively in the 1980s, and totalling 1.3 billion tons of soil lost to the Jinsha River alone. However, at a time when ecological degradation and biodiversity loss has been taking place at an alarming rate in Northwest Yunnan, our case studies show that a large number of plant communities and species have been preserved in various sacred sites. In many areas in Northwest Yunnan, especially at the community and micro-watershed level, sacred forests are the only examples of protected lands.

2. Sacred Sites

Sacred sites or sacred natural sites can be considered as special types of landscape areas that have been created, worshipped, and protected by local people for reasons related to their cultural beliefs. The terms employed here include places such as sacred groves, holy hills, holy forests, religious forests, Fengshui lands, and religious sanctuaries; terms used by many authors.

Sacred sites may contain sacred items or objects, such as sacred trees, sculptures or images of god, religious buildings and instruments. In the formation of a sacred site, these items are closely connected with their natural surroundings, and worship of these sacred items is extended to the habitats that are culturally associated with them. From this perspective, sacred sites are cultural landscape fragments and an ecosystem type that maintains material and energy exchanges with the outside environment through natural ecological processes and related cultural practices. As the

visual result of interaction between natural and cultural forces, sacred sites have a profound impact on biodiversity conservation.

Numerous sacred sites are obviously associated with cultural beliefs. For instance, in Northwest Yunnan, the cultural context of most holy forests, or "dragon hills", is primarily animist — primitive natural and spiritual worship — while burial forests, fengshui lands, and ancestral temples are chiefly connected with ancestor worship. Celebrity temples are a product of oracle worship. The creation of Buddhist and Taoist temples and some religious mountains is more likely related to their respective theological religions. Many sacred sites have double or even multiple cultural origins. For example, the famous Meli Snow Mountain in Deqe Prefecture (known as the sacred Khabadkapo in Tibetan language) has a cultural context that includes both Tibetan Buddhism (Mizong) and local polytheistic religion (Bon). In the sacred Shibao Mountain of Dali Prefecture, sculptures of Buddha, Zhangtianshi (legendary founder of Taoism), and Confucius are venerated alongside each other; the religious context of Benzhu Temple of the Bai People is even more complex, as it may include various gods emanating from Buddhism, Taoism, local heroes and natural objects.

Considering their natural properties, their composition and size, we can divide the sacred sites of Northwest Yunnan into the following three types:

1) Sacred forests*: primarily comprised of natural objects (plants, animals, rocks and hills etc.), sacred forests usually range in size from one hundred square meters to one thousand hectares. They include sites formerly named holy hills, holy groves, dragon hills, burial forests, and Fengshui forests.*
2) Temple sacred sites*: a combination of artificial building(s) (towers, halls, sculptures, stone inscriptions), and associated natural objects (gardens, ponds, surrounding forests), in Northwest Yunnan, larger local temples can be categorized as temple sacred sites, along with the more commonly known theological temples.*
3) Sacred mountains*: mountain natural-cultural complexes of varying sizes, from several square kilometres to over one thousand square kilometres, sacred mountains often include more than one temple sacred site or sacred forest and are usually well known as belief-reposing lands, as well as for their natural scenery. Sacred mountains are also called Religious Mountains in China, and over one third of the "famous mountains" in the country belong to this type (Zheng 1998).*

2.1 Sacred Forests

Sacred forests are the most important and extensively distributed sacred sites in Northwest Yunnan. Our survey illustrates that in Northwest Yunnan, many ethnic villages, including that of Yi, Lisu, Dulong, Bai, Tibetan, Naxi, and Nu, have at least one patch of forest that is forbidden — reserved for their spirits, ghosts, or ancestors. Traditionally, gathering, hunting, logging, and cultivation were prohibited practices in these forests. Religious rituals were carried out at certain periods of the year within the forest or in front of it.

Most of the sacred forests are formed on the basis of primitive worship; this is particularly true of natural and ancestor worship. They are highly diverse in cultural significance and local impor-

tance. In traditional Lisu and Naxi areas, each village had at least one community sacred forest. As different spirits were revered in different places, villages often had more than one sacred forest. Around the Lisu villages of Nujiang Prefecture, for example, we found at least three community sacred forests; *Libeikan* is the forest of the ancestors, *Mishi* is for the ghosts or spirits and *Youtong* is preserved especially for gods. In Lijiang Prefecture, *Jitianlin* (forests for sacrifice of the sky god) are the most common sacred forest for local Naxi villages. However, in mountain areas we discovered that some Naxi villages may have other sacred forests, such as "coffin forests" (preserved for coffin-making) and *Xunqing* forests (places for suicide, a unique tradition of Naxi people in the case of marriage proposals denied by their parents. Typically these have beautiful scenery, symbolizing paradise). This is in addition to their *Jitianli*". In Ninglang County, some Mosou villages traditionally protected a large patch of forest called *Tuguanlin*, which means "the forest of the local ruler". Here, the worship of political force appeared in the form of cultural belief.

Table 1. *Plant-species diversity of sacred forests and control plots in the Laojunshan area of Lijiang County* [1]

Vegetation types[2]	I	II	III	IV	V	Average
Sacred forests	1.94	2.47	1.92	1.96	1.04	1.87
Control plots	2.12	2.11	1.81	1.90	1.02	1.79

Notes: [1] Species diversity is expressed by the Shonan-Wiener Index (see Magurran 1988).

[2] Vegetation types from low to high elevation are: I. Conifer forest (pine forest); II. Semi-humid evergreen broadleaf forest; III. Temperate hard evergreen broadleaf forest (oak forest); IV. Temperate mixed conifer and broadleaf forest (Tsuga forest); V. Sub-alpine conifer forest.

Ecologically, the vegetation types vary greatly among the different sacred forests, but for the most part they correspond to the vertical and horizontal zonation patterns of the region. Our ecological studies in Lijiang County demonstrated that these sacred forests of different elevations, regardless of their cultural backgrounds, provide us with a set of forest relicts that indicate the original vegetation or the "natural vegetation background" of the stands. Many sacred forests have a clear boundary with their adjacent areas, from which they differ significantly in their species composition and vegetation types. To better understand and to quantify the effects of cultural beliefs on forests, we compared the species diversity and community composition between the sacred forests and control areas with the same vegetation types and similar physical environments.

The results show that in general the species diversity of sacred forests is significantly higher than that of the control plots (P 0.05) (Table 1), and there are more diagnostic components and less pioneer components in the sacred forests (P 0.05) (Table 2). As the percentages of diagnostic

Vegetation types[5]	Sacred forests			Control plots		
	Diagnostic component[2]	Sharing component[3]	Pioneer component[4]	Diagnostic component	Sharing component	Pioneer component
I	18.2	53.9	27.9	28.4	40.2	31.4
II	30.3	44.9	24.8	27.8	43.7	28.5
III	34.8	45.8	19.4	30.2	54.0	23.8
IV	19.1	56.4	24.5	16.7	57.4	25.9
V	54.7	35.1	10.2	44.6	36.6	18.8

Notes: [1] data are shown as the percentage of respective component species in total species of the community. [2] species found only in a certain vegetation type or in a certain succession phase. [3] species shared by a few vegetation types. [4] species shared by many vegetation types and commonly distributed. [5] Vegetation types from I–V, see note to Table 1.

Table 2.
Plant community composition of sacred forests and control plots in the Laojunshan area of Lijiang County (%) [1]

and pioneer components can be used as an indicator of disturbance intensity when compared to the undisturbed "primitive type", it is suggested that the sacred forests in the study are generally richer in species diversity and more similar to "primitive vegetation". They contain more "diagnostic species", which are threatened or have even disappeared in surrounding degraded environments.

Current management and protection of these sacred forests also vary considerably among the different areas, ethnic groups, and villages. Land tenure of the forests is mostly organized as collectively owned lands managed by rulers and set by villagers. Although the vegetation of the majority of sacred sites is secondary forest, today well preserved sacred forests can only be found in certain remote mountain areas. These sacred forests, with an explicit conservation ethos and ranging in size from 0.01–1000 hectares, constitute a kind of protected area at the community level and are an important visual element in the modern mountain landscape. In our case studies, we found that the combined area of sacred forests in a Naxi village can account for 2–13 percent of the collectively-owned land area in Lijiang County. They are often presented as the only patches of natural forest in agricultural landscapes in which most natural vegetation has been destroyed. In Northwest Yunnan, they are still very important protected places, and in many areas outside the formal nature reserves, they are the *only* protected lands.

Even today, sacred forests still provide multiple services for local communities. Most of them are situated around villages or beside farmlands and have positive effects on water loss and soil erosion. They also provide local villagers with food, medicinal plants, natural fertilizers, and other resources. In a Naxi village in Lijiang County, for instance, a sacred coffin forest has been preserved since 1913. According to village law, only villagers more than fifty years old can select a tree in the coffin forest as their coffin material. It is also the place where many collective rituals are carried out. In 1996, the villagers jointly decided to sell two hundred forest trees to raise funds for village electricity installation. Thus, the sacred forest is of great significance for the local community. As an important sacred site, and with the coffin forest exclusively reserved for the community, it is economically significant for the community and is culturally and socially important as a collective property depositary.

Table 3. *The numbers, distributions and believed ethnic groups of theological temple sacred sites in Northwest Yunnan*

Religion	Number	Distribution (county)	Believed Ethnic groups
Tibetan Buddism	125	Zhongdian, Deqin, Weixi, Lijiang, Ninglang, Gongshan, Lanping, Fugong	Tibetan, Naxi, Pumi, Nu
Chinese Buddism	97	All counties of Dali Prefecture, Lijiang, Yongsheng, Huaping	Chinese Han, Bai, and Naxi
Taoism	28	All counties of Dali and Lijiang Prefecture, Weixi, Lanping, Liuku	Chinese Han, Bai, and Naxi
Islam	45	Dali, Weishan, Eryuan	Hui, Bai
Christianity	145	All counties in NW Yunnan	Chinese Han, Miao, Lisu, Yi, Nu and Dulong
Catholicism	7	All counties in Nujiang Prefecture	Chinese Han, Yi, Miao, Lisu and Nu

2.2 Temple Sacred Sites

Temple sacred sites of Northwest Yunnan are also highly diversified. Various temples, from the primitive religious temples to theological temples, are scattered across the region. These sacred sites reflect the different phases of local religious development as well as the history of cultural exchange spread across the region. There are at least 447 theological temples in Northwest Yunnan, including Tibetan Buddhist temples, Chinese Buddhist and Taoist temples, Islamic mosques, and

Christian churches (Table 3). Their respective committees, composed of monks, manage most of these temples. There also exists a large number of local religious temples, such as *Benzhu* temples, land-god temples, and oracle temples, which are mostly managed by local communities, with usually one or a few village believers who act as custodians.

Chinese Name	Scientific name	Chinese name	Scientific name
Cuibai	Calocedrus macrolepis	Ciyi	Docunia delavayi
Xiangbai	Cupressus duclouxiana	Mei	Prunus mume
Cebai	Platycladus orientalis	Shengliu	Tamarix chinensis
Yuanbai	Sabina chinensis	Yingxin	Ginkgo biloba
Zhang	Cinnamomum sp.	Huanglianmu	Pistacia chinensis
Yunnan Hanxiao	Michelia yunnanensis	Shancha	Camellia reticulata
Chuandian Gaoshanli	Quercus aquifolioides	Qishu	Acer sp.
Heitao	Juglans regia	Lijiang Tiesha	Tsuga forrestii
Lijiang Yunsha	Picea likiangensis	Gaoshanrong	Ficus altissima
Liu	Salix sp.	Yousha	Keteleeria evelyniana
Guihua	Osmanthus fragrans	Huaishu	Styphuolobium japanicum
Gaoshankao	Castanopsis delavayi	Longnuhua	Magnolia wilsonii var. taliensis
Huangjiaoshu	Ficus vitens var. sublenceolata	Shanyulan	Magnolia delavayi

Table 4.
Some religious plants found in the Tibetan Buddhist temple sacred sites in Lijiang County

In Northwest Yunnan, maintaining and preserving the environment, both in and outside the sacred temples, is a common custom. The creation of sacred temples is often accompanied by the planting of certain plants. Plantation occurs not only in temple yards but also in the surrounding areas. In Dali, around many newly built temples, local people actively plant trees and protect the natural vegetation surrounding the area. Many sacred temples preserve at least one patch of forest, called temple forest, as temple property, which is usually in close proximity to the temple. The forest patch behind Songzanlin Monastery in Zhongdian County is now the only forested land in the area, providing an insight into the area's original natural vegetation type. These activities and examples suggest that traditional culture can be a positive force in ecological rehabilitation and nature preservation.

Local religious temple sacred sites are closely associated with and indeed originate with sacred forests. A number of these temple sacred sites have evolved from sacred forests (Zhang 1993). The worship of natural objects (forests and trees) is prevalent in these temple sacred sites. In practice, many plants are objects of worship — for example, pines, cypresses, bamboos, and banyan trees — and are called "religious plants". They have gradually progressed toward the temple sites from the wild. Many of them have been preserved for more than one hundred years, and in some cases for up to three hundred years.

Table 4 lists some of the "religious plants" we discovered in the Tibetan Buddhist temple sacred sites of Lijiang County. These plants provide us with valuable material for cultural, historical, and environmental studies in the region. Using ethnobotanical approaches, we found that some "religious plants" reflect cultural exchange history and acculturation. For instance, a number of the cypress tress found in most of the sacred sites indicate the profound influence of Tibetan Buddhism; the Ginkgo trees, Magnolia, and Sabina may represent evidence of traditional Chinese Han culture; and the *Castanopsis*, *Quercus* and *Tsuga* are apparently a result of local primitive beliefs.

These religious plants, along with other plants in the temple yards and associated temple forests or grasslands, are instinctively preserved by local peoples and have constituted a kind of "religious botanical garden" that is usually much bigger in size than the temples themselves. The question is not whether they are useful in themselves but how best to make use of these "religious botanical gardens" in modern conservation efforts.

2.3 Sacred Mountains

Sacred mountains are another important form of sacred site. Most of them are state-owned forest lands. Many well-known tourist areas in Northwest Yunnan are protected sacred mountains that were originally preserved because of historical beliefs. These sacred mountains are more often associated with theological religions, especially Buddhism and Taoism. Some of these sacred mountains and their religious contexts are listed in Table 5. Most mountains are culturally connected with Buddhism, showing the strong impact of Buddhist culture on the creation of sacred mountains in Northwest Yunnan.

Name	Location (county)	Area (km2)	Religion	Protection status
Cangshan Mountain	Dali	693	Taoism and Buddhism	Provincial
Jizu mountain	Binchuan	28	Buddhism	Provincial
Meli Snow Mountain	Diqing	564	Buddhism	Provincial*
Baima Snow Mountain	Diqing	190	Buddhism	National
Haba Snow Mountain	Zhongdian	220	Buddhism	National
Yulong Snow Mountain	Lijiang	26	Dongba and Buddhism	National
Laojun Mountain	Lijiang	432	Taoism and Buddhism	Provincial
Samage Mountain	Weixi	131	Local religion and Buddhism	National
Qianfo Mountain	Zhongdian	74	Buddhism	Provincial*

Table 5. *Some sacred mountains and their current status*

Mountain worship is one of the most characteristic cultural beliefs of Tibetan people. Before Buddhism was introduced in the Tibetan region, it was the very foundation of the whole belief system for Tibetan communities (Xie 1988). The spread of Buddhism across the Qinghai-Tibetan Plateau did not dampen worship — on the contrary, it endowed the sacred mountains with new and even more important significance. In Deqe, a Northwest Tibetan Prefecture of Yunnan Province, local Tibetans believe that mountain gods, who live on the peaks, govern all the land, animals, and people. Among all the sacred mountains, Meli Snow Mountain (Khabadkapo), the largest and highest, is of particular importance, not only for local Tibetans but for all believers of Mizong (Kagyupa, one of the most important branches of Tibetan Buddhism). With a peak at 6,740 metres above sea level and a total area of over two hundred square kilometres, it is ranked as one of the eight most important sacred mountains of the Tibetan Plateau. Each year, thousands of believers from Yunnan and other parts of the country embark on a pilgrimage to the mountain

to worship and offer sacrifices and to perform the Buddhist prayer practice of *Zhuanjing* (walking around the mountain, which usually takes one month). Hunting, logging, or anything that may be considered as "polluting" the mountain is strictly taboo. Even climbing is forbidden (over the past two years, at least two climbing expeditions had to be cancelled because of local objections). The sacred mountains have constituted the local framework for nature conservation, and large areas of forests have been successfully preserved in the prefecture. In Northwest Yunnan, there exists a huge Tibetan sacred site system that combines sacred forests and sacred mountains. Khabadkapo is positioned at the centre in this system. Surrounding it is a number of lower mountain groups of gods. The famous Baima, Haba, and Qianfo mountains are believed to be parts of the system, which encompasses not only the Tibetan area of Deqe Prefecture, but also some areas in the Sichuan and Tibetan territories. Within the system, cultural hierarchical rank stretches from the top echelons down to the community level. In this way, local Tibetan people share one or several sacred mountains at regional and village level; they have their own sacred forests, forming the Tibetan sacred site system in Northwest Yunnan.

3. Biodiversity Conservation and Environmental Rehabilitation

It has been widely demonstrated that cultural and biological diversity are intimately and inextricably linked. Human culture is built upon and developed on the basis of the physical world: they are interdependent (McNeely 2000). In many indigenous mountain areas, traditional cultures have contributed to the formation and transformation of biodiversity through the use of certain practices and the management of natural resources. Under the harsh conditions of the mountainous environment of Northwest Yunnan, maintaining the fragile balance between man and nature is crucial for the survival of indigenous people. As objects of their cultural beliefs, forests are their most important resource for their subsistence and the key to maintaining the fragile equilibrium. When forests are inhabited by gods or ghosts, the association between local people and the forests is transformed into a relationship between man and the gods or ghosts, with man's worship of the gods replaced by man's worship of the forest (Chen 1997). From this perspective, the worship and protection of forests can be considered one of the many traditional cultural mechanisms performed by local societies to support nature conservation; to restrain the destructive nature of man in the name of the gods. The indigenous preservation of sacred sites is therefore an active ecological conservation method driven by the cultural beliefs of the local people. The roles and functions of cultural forces should accordingly be taken into full consideration in conservation and development planning.

Sacred sites are thus a visible result of the forces of traditional cultural belief modifying the landscape. In many places in Northwest Yunnan, especially at the community and microwatershed level, sacred forests are the only protected lands. Along with the species they preserve,

sacred forests are important in maintaining ecological heterogeneity and therefore the stability of production systems. A large number of sacred sites located in proximity to mountain villages form "green islands" in farmlands. They can be seen scattered around and between natural reserves where they play a role, much like "stepping stones", in promoting the flow of biological populations and gene exchanges. Since the late 1990s, the Chinese Academy of Sciences has undertaken a project to collect and screen the plant species that are suitable for vegetation rehabilitation in the Hengduan Mountains. According to sampling records, about 230 species have been selected, among them, over sixty species were collected in various sacred sites. As sacred sites often contain threatened species in their surrounding areas, they can also serve as gene pools for local or even regional environmental rehabilitation.

To protect wildlife species and to prevent the natural environment from further degradation, the Chinese government has established twelve nature reserves in Northwest Yunnan since the 1960s, covering 6 percent of the total area. Although most of the nature reserves of Northwest Yunnan are in fact established on the basis of religious mountains (Table 5), there are still many sacred sites that go unnoticed by outsiders. As Pelink (1998) suggested, much natural and agricultural biodiversity actually exists outside the current nature reserves and may thus be disappearing unsuspectingly in the process of "modernization". Further identification and incorporation of this vernacular system into modern conservation measures is urgently needed.

In 1998, China's government launched a national project called the National Natural Forest Protection Project (also known as the "logging ban"). It aims to stop all commercial logging and to promote environmental rehabilitation in the upper reaches of important rivers. Part of the project involves establishing Northwest Yunnan as a key implementation region that encourages a number of policies and calls for the participation of all social sectors in "ecological construction". This offers a new opportunity to preserve the region's biodiversity and is also a unique opportunity to recognize and value sacred sites and the importance of integrating them into modern conservation and development strategies.

Conclusion

To conclude, there exists a very strong and complex relationship between the mountain cultures of ethnic minority groups and mountain biodiversity in Northwest Yunnan. Sacred sites, as a visual result of interaction between traditional cultural beliefs and the natural environment, have played a very positive and effective role in environmental and biodiversity conservation in the region. They also demonstrate great potential in ecological rehabilitation.

There are three types of sacred sites scattered throughout Northwest Yunnan: sacred forests, temple sacred sites, and sacred mountains. In watersheds, different types of sacred sites, from the species level to the landscape level, constitute a culture-based natural conservation system — a sacred-site reserve system in practice. Compared to many modern conservation methods, the sacred

sites reserve system has a far longer history, which is deeply embedded in local cultures and which benefits from the participation of local communities. This system can be seen as an important part of vernacular conservation and a useful complement to modern preservation frameworks.

Acknowledgements

The authors would like to acknowledge the support of the Center for Biodiversity and Indigenous Knowledge (CBIK) in Yunnan and the Chinese Academy of Sciences (Project KSCX1-07) and the Ministry of Science and Technology (Project 2001BA606A-05) for the research undertaken. Special thanks also go to Dr. Xu Jianchu of the Kunming Institute of Botany, Chinese Academy of Sciences, for his important assistance.

References

Chen, G. L. 1997. *Primitive Religions in Southwest China*. Chengdu, China: Sichuan People's Publication House, 45–57

Magurran A. E. 1988. *Ecological Diversity and its Measurement*. New Jersey: Princeton University Press.

McNeely, J. A. 2000. Cultural Factors in Conserving Biodiversity. In *Links between Culture and Biodiversity,* edited by J. C. Xu. Kunming, China: Yunnan Science and Technology Press, 128–142.

Mittermeier, R. A., N., P. Myers, G. Robles, and C. G. Mittermeier, eds. 1999. *Hotspots: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions.* Mexico City: Agrupacion Sierra Madre, S.C. in association with CEMEX.

Pelink, E. 1998. Community-Focused Approaches to Biodiversity Conservation. *ICIMOD Newsletter*, no.31: 4–5.

State Environment Protection Bureau, China. 1998. *State Report on the Biodiversity of China*. Beijing: Science and Techology Press (in Chinese).

Zhang, Q. G. and L. S. Chen. 1993. *Religious Anthropology*. Chengdu, China: Sichuan University Press, (in Chinese).

Zheng, L. 1998. The Well-Known Mountains of China. *Chinese Mountain Research*, 16: 21–26 (in Chinese).

Xie, J. S. 1988. Legends of Tibetan Mountain Gods and Their Cultural Features. *Tibetan Reseach* 4: 12–35 (in Chinese).

Workshop Report

Introduction

1. An international workshop on the topic "The Importance of Sacred Natural Sites for Biodiversity Conservation" was held in Kunming (17–18 February 2002) and Xishuangbanna Biosphere Reserve (19–20 February 2003) in the People's Republic of China. The workshop was organized by UNESCO's Man and the Biosphere (MAB) programme in collaboration with the Kunming Institute of Botany of the Chinese Academy of Sciences, the Xishuangbanna Tropical Botanical Garden, and the Chinese National Committee for the Man and the Biosphere programme. Support for the workshop was provided by UNESCO-MAB, the cross-cutting Local and Indigenous Knowledge Systems (LINKS) project, the World Conservation Union (IUCN), and the World Wide Fund for Nature Mexico Programme (WWF-Mexico). The UNESCO Offices in Beijing, Jakarta and New Delhi also provided funding to enable the participation of selected workshop participants.
2. UNESCO took the initiative of organizing the workshop as its topic is of relevance to at least two UNESCO undertakings: the Man and the Biosphere programme and the Local and Indigenous Knowledge Systems project. The MAB programme develops the basis, within the natural and the social sciences, for the sustainable use and conservation of biological diversity, and for improving the relationship between people and their environment globally. It encourages interdisciplinary research, demonstration and training in natural-resource management. MAB contributes thus not only to a better understanding of the environment, but to the greater involvement of science and scientists in policy development concerning the wise use of biological diversity. As part of the MAB programme a pilot project on sacred groves in northern Ghana has yielded important results for future work. In 1998, UNESCO-MAB organized an international symposium on sacred natural sites at UNESCO headquarters in Paris.
3. LINKS is a project bringing together expertise from across UNESCO; bridging Natural, Social and Human Sciences, Education, Culture and Communication, and Information sectors. Local and indigenous knowledge has gained international recognition as a vital factor for sustainable development and biodiversity management. These knowledge systems, which are significant manifestations of the world's cultural diversity, provide the basis for local-level decision-making about fundamental aspects of day-to-day life. The LINKS project promotes local knowledge, values and worldviews as tools to shape and achieve the Millennium Development Goals of poverty eradication and environmental sustainability. In this manner it seeks to empower rural and indigenous communities, while building equity in governance, enhancing cultural pluralism and sustaining biodiversity.

Workshop Objectives

4. The workshop's objectives were to address, at the interface of biological and cultural diversity, models and methodologies for comparative, inter-regional collaboration on biodiversity and environmental conservation based on culturally important areas, in particular sacred natural sites. Work on ongoing case studies was presented

addressing traditional mechanisms of environmental conservation in the differing regional contexts of Africa, Asia-Pacific and Latin America. It was expected that similarities in the traditional management of sacred natural sites would help formulate guidelines for policy-makers in the conservation of these sites for future generations. Emphasis was placed on the interrelationship between biological and cultural diversity in the light of promoting sustainable development. The workshop was considered to be a preparatory session for the forthcoming IUCN "World Parks Congress" (Durban, South Africa, September 2003), during which UNESCO and IUCN's World Commission on Protected Areas (WCPA) Task Force on Non-Material Values will organize a session on sacred natural sites.

5. The background and rationale of the workshop stems from the concern that in many developing countries, national parks or other protected areas have not always achieved the primary objective for which they were established (i.e. environmental protection), as the concept of a national park is essentially Western and often unfamiliar to non-Western societies. However, many community-based protected areas exist throughout Africa, Asia-Pacific and Latin America as *sacred natural sites*. Due to restricted access, these sacred natural sites (mountains, groves, rivers etc.) are often pristine ecosystems within otherwise degraded environments. They have survived environmental degradation precisely because they are well-rooted in local cultures and traditional belief systems. Moreover, sacred natural sites play an important role in the conservation of species and the rehabilitation of degraded environments, thus promoting sustainable development and alleviating poverty in rural areas.
6. The workshop also served to address the secrecy of sacred places, their potential to foster peace and understanding among different cultures, and the role of traditional ecological knowledge in the light of community-based management of sacred natural sites. Custodians of sacred natural sites possess a wealth of knowledge about the site's plant and animal species, due to their medicinal properties and their role in all aspects of everyday life. In addition, custodians often understand the importance of these sites to ecosystem functioning and their role in supplying fresh water, as many natural sacred sites contain water sources. At the same time, custodians are increasingly aware of mounting pressures on these sites due to, among other things, land degradation in adjacent areas as a consequence of poverty and demographic growth. Custodians are therefore indispensable partners in helping to conserve the natural environment, as the protection of sacred natural sites is of mutual benefit to environmentalists and local people and cultures.

Workshop Papers, Discussions and SWOT Analysis

7. Twenty-seven participants from Africa, the Asia-Pacific region, Latin America, and North America took part in the workshop (the list of participants is attached as Annex 3 to this report). Specific case studies on sacred natural sites were presented from Australia, China, India, Indonesia, Japan, Kenya, Madagascar, Mexico, Mongolia and Nepal (see Workshop Agenda appended as Annex 2). Several of the sacred natural sites mentioned had a legally protected area status (including biosphere-reserve status), while others were protected solely because of their sacred site status. While a number of differences are apparent throughout the world's regions, a large number of similarities appear with regard to the origins, status, conservation and management of sacred natural sites, clearly demonstrating that sacred natural sites play a pivotal role in biodiversity conservation.

8. The workshop participants used the SWOT analysis technique (SWOT = Strengths, Weaknesses, Opportunities, Threats) to identify a number of key issues with regard to the role of sacred natural sites for biodiversity conservation (i.e. their lack of recognition and their changing value systems, which may jeopardize their traditional protected area status). However, as the protection of natural sacred sites is often more sustainable than the protection of other natural sites through classic legally protected area status, and as they often contain a higher degree of biodiversity (as was reported by several case studies), their recognition and study was considered vital by workshop participants. Moreover, workshop participants considered the importance of community-based development, local participation in decision-making processes, and eco-tourism — as well as their potential as indicator sites for the rehabilitation of degraded environments. In particular, workshop participants considered the importance of formulating guidelines for the sustained protection for sacred sites and their management and recognition by public authorities.
9. The results of the SWOT analysis are attached as Annex 1 to this report.

Creation of an International Network

10. The workshop participants decided to create an International Network on Sacred Natural Sites for Biodiversity Conservation spanning Africa, Asia/Pacific and Latin America, which would increase collaboration among workshop participants and other interested parties. The workshop website (http://biowest.ac.cn/sns/), set up by Prof. Hu Huabin, could well serve as a reference for and information on the new network. The main purpose of the new network will be to test and validate policy guidelines on the conservation and management of sacred natural sites using on-going studies and conservation schemes in place at the sacred natural sites discussed during the workshop. The network will thus have (a) a *scientific objective* (to improve understanding of the mechanisms of culture-based environmental conservation) as well as (b) an *application-oriented and policy-relevant objective* (to foster national and international recognition for such sites, and with the full cooperation of local custodians and communities, to consider management guidelines for the protection of sacred naturals sites). The network could also serve to promote attitudes that place people as part of nature, thus promoting the sustainability principle in environmental management.

Future Steps

11. The workshop papers will be published by UNESCO. Mr Thomas Schaaf (UNESCO-MAB) and Mr Allen Putney (IUCN-WCPA) will prepare a zero-draft version of the Guidelines on Sacred Natural Sites, based on the papers presented at the workshop and the workshop's SWOT analysis, should be available for subsequent consideration at the World Parks Congress in Durban, September 2003 (within the stream "Creating Public Support for Protected Areas").
12. A future workshop on the new network should ideally be held in 2004 or 2005 (possibly in connection with an international symposium to be organized at the World Expo in Aichi, Japan, 2005).

Field Trip

13. During the field trip to Jinhong and the Xishuangbanna Biosphere Reserve, workshop participants had the opportunity to see a holy hill above the Dai village of Chengzi. Most Dai villages in the area have a sacred forest above the settlement. Many of them were seriously logged and damaged during the Cultural Revolution, though they are enjoying a vigorous regeneration into secondary forests, largely due to community-based conservation. The designation of the Xishuangbanna site as a biosphere reserve has greatly helped to increase the nature reserve's visibility, and tourism is developing rapidly (120,000 visitors in 2002). Problems persist with the elephant population, despite the fact that they are a major tourist attraction, causing two or three casualties a year. Poaching was a problem up until about five years ago when the government authorized the confiscation of weapons from local people. The butterfly farm has been a great success, both for tourists and the local people. Indeed, the latter are now setting up their own butterfly farms with the assistance of the biosphere reserve staff, to generate alternative income opportunities. Other tourist facilities in the biosphere reserve include a cable car (a thirty-five-minute ride above the tropical canopy) and large-scale aviaries and vivaria for snakes and reptiles, as well as traditional Dai dance and music performances.

Annex 1

Results of SWOT Analysis

Note: While a SWOT analysis addresses internal factors (strengths and weaknesses) as well as external factors (opportunities and threats) of a given issue, the analysis was limited by time constraints during the workshop. The positive factors (strengths and opportunities) and the negative factors (weaknesses and threats) were therefore treated jointly.

I. Strengths and Opportunities

A. High Conservation Value

Many sacred natural sites (SNS) present high biodiversity and are often important for freshwater conservation. As a result of low human impact and restricted access, they are often found in a pristine state, in virtually all representative ecosystems and landscapes, thus serving as sanctuaries for rare, endangered, and endemic species. Their role as gene pools for biotic resources can directly contribute to the conservation of species and ecosystems that are susceptible to disturbances. In particular, in areas suffering from excessive human impact resulting in environmental degradation, they can serve as "indicator sites" for the restoration and rehabilitation of degraded systems. Based on species inventories in SNS, strategies can be formulated for the reintroduction of native and endemic species in a wider spatial context than the area covered by the SNS itself.

B. More Sustainable Dimension of Protection

SNS are community-based conservation areas. As they are fully in line with traditional belief systems and values, they tend to be more sustainable than classic legally protected areas. Local people often manage SNS in ways that have proven to be quite effective in protecting natural habitats and human livelihoods over long periods of time. In fact, the long-term preservation that results from such voluntary protection can enable long-term biological successions in the SNS. This long-term preservation allows certain S NS to be used as public awareness demonstration sites, offering children the opportunity to witness active sustainable resources management and nature conservation.

C. Model Sites for Management

SNS reflect a more holistic view of Man–Nature interactions. They integrate cultural and natural values in a single management system. As SNS are community-based conservation areas, they can be considered as model sites for participatory conservation strategies and practices. As local people clearly understand the importance of protecting "their" SNS, such culturally important sites facilitate community participation in overall resource management and development. In this context, much can be learned from formulating buffer-zone management schemes around protected core areas. Moreover, in legally protected areas with a resident population, the integration of SNS can improve people's attitude towards protected area regulations.

D. Preserving Traditional Knowledge

Classical western science (in the Cartesian sense) is not the only path to knowledge acquisition. The local and traditional knowledge of adapted land-use practices found in SNS can provide valuable models. Many SNS serve as "healing sanctuaries" (often coupled with the application of traditional knowledge on medicinal plants) for people from a much wider area than the one spatially covered by the SNS. Traditional ecological knowledge (TEK), through an intimate knowledge of local plant and animal resources, is often applied with æregard to managing SNS, providing good opportunities for integrating western science and traditional knowledge systems. The analysis of traditional ecological knowledge can help in formulating concepts and approaches towards sustainable biodiversity management. Such knowledge can also be used for educational purposes (both cultural and in the natural sciences).

E. Manifestations of Culture and Cultural Diversity

As carriers of culture-specific worldviews and traditional belief systems, SNS have tremendous cultural value. In many cases, SNS are reference points of cultural, religious and national identity. In other cases, cultural rites and practices (music, song, dance, poetry, folklore), which should be preserved in the context of maintaining cultural diversity, are associated with SNS. The recognition of SNS offers a possibility to support fragile and disappearing cultural systems, particularly through the transmission of traditional knowledge passed on by community elders. As beacons of indigenous values, SNS can also help to recognize the rights and cultures of indigenous peoples and the livelihoods within which they are sustained.

F. Eco-Tourism

SNS are part of the cultural and natural heritage of a specific group of people. At the interface of culture and nature, they can provide important opportunities for eco-tourism development, assisting visitors in experiencing new cultures while learning about nature. If practised and managed well, eco-tourism linked to SNS can benefit local people directly, particularly if due respect is paid to indigenous and local peoples as *full partners* in the development of conservation and eco-tourism policies. Moreover, SNS can provide an intercultural space to examine human-nature relationships from different cultural perspectives: as such, they can serve to build bridges for intercultural relationships with peoples that often have been subject to discrimination and racism.

G. Sacredness a Value in Itself

The sacred nature of SNS has an intrinsic value that should be respected and preserved. It is most interesting to note that many fundamental religious, spiritual, and philosophical values are shared between different cultures — illustrating that cultural and biological diversity are again intertwined and are reinforced by the unique and long-established relations between people and place embodied in SNS.

II. Threats and Weaknesses

A. Insufficient Recognition

SNS suffer from their lack of recognition, both by governments and the wider public. In particular, modern national policies and legal systems in many countries do not acknowledge the importance of SNS, therefore their conservation and management is not integrated into policy-making. Overall land-management strategies do not include indigenous peoples in decision-making processes as regards SNS. It is often very difficult to obtain public funding for the conservation of SNS. Knowledge about sacred natural sites and their importance for cultural preservation and biodiversity conservation is not included in school curricula. Finally, local and traditional knowledge — often intrinsically linked with SNS — is not recognized in many scientific circles or at official policy level. The lack of recognition of SNS may be a result of the diversity of cultural traditions associated with SNS, as governments often find it difficult to integrate all these aspects into one coherent policy.

B. The Secrecy of the Sacred

Secrets held by custodians of SNS may result in their non-recognition. This is often due to the reticence of indigenous/traditional peoples to reveal their spirituality or disclose their knowledge to outsiders. The spiritual aspects of SNS may be confined to only a few initiated individuals, therefore general knowledge transfer of the SNS is restricted or taboo. When SNS are exposed to outsiders who do not share or respect their cultural or sacred beliefs they may lose their significance or meanings, or be exposed to abuse. Finally, access to SNS can be restricted to specific ethnic groups only — reinforcing cultural differences and conflicts.

C. "Arbitrary" Selection

From a biodiversity-conservation perspective, SNS are "arbitrarily" selected and do not follow a systematic pattern that would enhance species diversity and conservation. For biodiversity conservation to be viable, SNS may be too small or fragmented. If an integrated landscape-management strategy is not adopted for both within and outside the SNS, there is a risk to environmental conservation generally. On the other hand, great caution should be exercised to ensure that ecological features are not the sole consideration, so that spiritual values are not disregarded.

D. Artificial Ecosystems

SNS are not necessarily pristine wilderness areas. They have often been shaped by human hands in various ways; for example, by favouring a specific species over another. Some SNS may contain a limited number of species or be too limited in size to be considered for biodiversity conservation. They do not have specific conservation targets and thus often cannot meet modern biodiversity-conservation standards, as they are associated with functions other than purely biodiversity conservation. They can be artificially maintained ecosystems/biotopes created by people. Population growth and population pressure may damage the "nature" in the SNS.

E. Cultural Changes

SNS are subject to changing value systems and cultures. Sites may lose or gain sacred value, and with this their environmental-conservation function. Modern economic development and associated changes of societal value systems will most likely significantly reduce the number and integrity of SNS in the future. Traditional cultural values are gradually disappearing in many areas, as younger generations no longer share the same values of older generations and subscribe to modernism, particularly in countries with very rapid transformation patterns. External influences from foreign and "modern" cultures can jeopardize the integrity of SNS. Moreover, the transmission of traditional knowledge is collapsing, partly also as a result of formal school education. At the same time, it must be recognized that culture is always dynamic and should not be artificially "fossilized", as even the documentation and preservation of the SNS could prevent their evolution.

F. Economic Benefits

Custodians of SNS are often not strong enough to resist the destructive forces that impact adversely on the sites. For example, local people do not always benefit from the economic returns when eco-tourism is developed around a SNS, and they are often not in a position to maintain the spiritual and physical integrity of the SNS. In the context of eco-tourism, great take care must be taken not to romanticize SNS.

G. Traditional Ecological Knowledge

While traditional ecological knowledge (TEK) is often tied to SNS, the study and validation of TEK is often only carried out when it is deemed useful to Western science; stripping the knowledge from both its context and the control of those who maintain it. This process denigrates the value and integrity of other kinds of knowledge that certain groups hold.

The diversity of SNS in different cultural regions of the world necessitates the setting up of criteria for identifying and classifying SNS to facilitate their recognition by national governments for policy implementation concerning the preservation of culture and nature. An international network to carry out studies on SNS is needed, as the management of SNS is often not documented.

Annex 2

Workshop Agenda

Sunday 16 February 2003

Arrival of workshop participants in Kunming, People's Republic of China.

Monday 17 February 2003

Morning Session

9:00 am –10:00 am Opening Session
Chairperson: Prof. Pei Shengji, Kunming Institute of Botany

- Opening of the workshop by Prof. Pei Shengji
- Opening address by Mr Liu Jiang, Chinese National Commission for UNESCO
- Environmental research and management in Eastern Asia, by Dr Axel Hebel, UNESCO-Beijing Office
- IUCN's perspective for the World Parks Congress, by Mr Allen Putney
- UNESCO's experience with the protection sacred natural sites for biodiversity conservation, by Dr. Thomas Schaaf, UNESCO-MAB

10:00 am – 10:20 am Coffee/tea break

10:20 am – 12:30 pm Thematic Session 1: Presentation of case studies from Africa and Latin America
Chairperson: Mr Allen Putney, IUCN

- Mr Anthony Githito (Kenya): The sacred Mijikenda Kaya Forests of coastal Kenya and biodiversity conservation
- Ms Hanta Rabetaliana (Madagascar): Sacred sites in Madagascar
- Ms Mercedes Otegui Acha (Mexico): WWF: Safeguarding Huichol and Seri indigenous natural and cultural heritages in Mexico
- Mr Alfonso Alem Rojo (Mexico): Experiences of indigenous peoples in Mexico, Guatemala and other Latin American countries on the conservation of their sacred natural sites
- Dr Derek Elias (Australia): the LINKS project and sacred sites in the Tanami Desert, Central Australia

1:00 pm – 2:30 pm Lunch break

Afternoon Session

2:30 pm – 4:00 pm Thematic Session 2: Presentation of case studies from Asia (other than China)
Chairperson: Ms Mercedes Otegui, WWF-Mexico Programme

* Prof. P.S. Ramakrishnan (India): Sacred landscapes in Sikkim, India
* Dr Herwasono Soedjito (Indonesia): Sacred sites of West Timor: Biodiversity treasure and cultural heritage
* Prof. Kunio Iwatsuki (Japan): Sacred mountains in Japan
* Dr Norov Urtnasan (Mongolia): Sacred sites in Mongolia
* Dr Lhakpa Sherpa (Nepal): Work of The Mountain Institute on sacred mountains and environmental conservation in South and Central Asia
* Mr Edmond Moukala (UNESCO-Beijing Office): Integrating people and culture within environmental strategies
* Prof. Anoja Wickramasinghe (Sri Lanka): Adam's Peak – the sacred mountain forest in Sri Lanka

4:00 pm – 4:15 pm Coffee/tea break

4:15 pm – 6:45 pm Thematic Session 3: Presentation of case studies from China
Chairperson: Prof. Kunio Iwatsuki, University of the Air, Japan

* Prof. Pei Shengji (China): The role of ethnobotany for biodiversity conservation
* Prof. Hu Huabin (China): Sacred sites in Xishuangbanna, China
* Dr Liu Hongmao and Mr Xu Youkai (China): Rehabilitation of holy hill site in Xishuangbanna.
* Mr Liu Wenjiang (China): Local knowledge and dryland management in Xingjian, north-western China
* Dr Luo Peng (China): Sacred sites in north-western Yunnan, China

6:30 pm – 8:00 pm Welcome banquet

Tuesday 18 February 2003

Morning Session

8:30 am – 10:30 am Thematic Session 4: Cultural and biological diversity — opportunities and threats of sacred natural sites for biodiversity conservation (using SWOT analysis)
Moderator: Dr Thomas Schaaf

10:30 am – 10:45 am	Coffee/tea break
10:45 am – 11:45 am	Thematic Session 5: Discussion on interregional collaboration and preparations for the World Parks Congress *Moderators: Mr Allen Putney/Ms Mercedes Otegui*
11:45 am – 12:30 pm	Lunch break
1:45 pm	Field Visit: Travel to Jinhong, Xishuangbanna Biosphere Reserve by plane. Guided two-hour tour through Jinhong and its park in the afternoon.
6:30 pm – 7:30 pm	Dinner Banquet

Wednesday 19 February 2003

8:00 am – 12:00 pm	Field Visit: Mengyang tropical forest area.
12:00 pm –1:00 pm	Lunch
1:00 pm – 6:30 pm	Field Visit: to Baka village and Ji'nuo Village Museum, then to Menglun township and holy hill site of Chengzi (Dai) village. Tour through and overnight stay at the Xishuangbanna Tropical Botanical Garden.
7:30 pm	Evening party

Thursday 20 February 2003

Morning Session

8:30 am – 10:00 am	Concluding Session
10:30 am – 12:00 pm	Travel back to Jinhong.
12:00 pm – 1:00 pm	Lunch
2:10 pm	Departure by plane from Xishuangbanna Airport to Kunming International Airport
3:00 pm	Arrival at Kunming International Airport and departure of participants.

Annex 3

List of Workshop Participants

Mr. Alfonso ALEM ROJO
Fundación Rigoberta Menchu Tum
Heriberto Frías 339, Col. Narvarte
03020 México DF
Mexico
Tel: (+52 55) 56391492, 56393091
Fax: (+52 55) 56393976
E-mail: alemrojo@rigobertamenchu.org

Prof. CHEN Xiaoming
Director
Southwest China Center for Ecology and Environment
Chinese Academy of Forestry Science
Kunming
Yunnan
People's Republic of China
E-mail: xmchen@public.km.yn.cn

Dr Derek ELIAS
Local and Indigenous Knowledge Systems
Environment & Development in Coastal Regions and Small Islands
UNESCO-Bangkok Office
1st Floor, Mom Luang Pin Malakul Building, Prakanong
920 Sukhumvit Road
Bangkok 10110
Thailand
Tel.: (+66-2) 391-0577, ext. 561
Fax: (+66-2) 391-0866
E-mail: d.elias@unescobkk.org

Mr Anthony GITHITHO
Coastal Forest Conservation Unit
National Museums of Kenya
P.O. Box 596 Kilifi
Kenya
Tel.: 254.125.22140
Fax: 254.127.2391
Email: cfcu-kilifi@kilifibks.africaonline.com
(attention: Mr Anthony Githitho)

Ms Kate HAMILTON
International Exchange Programs
Yunnan University
2 North Cuihu Rd.
Kunming, Yunnan
People's Republic of China

Dr. Axel HEBEL
UNESCO Beijing Office
Jianguomenwai
Waijiao Gongyu 5-15-3
Beijing 100600
People's Republic of China
Tel: (+86-10) 6532 5883
Fax : (+86-10) 6532 4854
E-mail: a.hebel@unesco.org

Prof. HU Huabin
Div. of Landscape Ecology
Forest Ecosystem Research Center
Xishuangbanna Tropical Botanical Garden
Chinese Academy of Sciences
88 Xuefu Road
Kunming
Yunnan 650223
People's Republic of China
Tel.: (+86-871) 5144433
Fax: (+86-871) 5160916
E-mail: huhb@xtbg.ac.cn

Prof. Kunio IWATSUKI
University of the Air
815-29 Kamoshida
Aoba-ku
Yokohama 227-0033
Japan
Tel. & Fax: (+81-45) 962-9761
E-mail: iwatsuki@u-air.ac.jp

Mr James LAVER
11th Floor, Unit B, Tower 2
Fairview Garden
1 Beili, Chaowai Street, Chaoyang District
Beijing 100020
People's Republic of China
Tel: (86-10) 8561-4683
Fax: (86-10) 8562-2553
E-mail: jimlaver@a-1.net.cn

Prof. LIU Hongmao
Director
Xishuangbanna Tropical Botanical Garden
Chinese Academy of Sciences
88 Xuefu Road
Kunming
Yunnan 650223
People's Republic of China
Tel.: (+86-871) 5144435
Fax: (+86-871) 5160916
E-mail: liuhm@xtbg.ac.cn

Mr LIU Jiang
Director
Division of Science and Culture
Chinese National Commission for UNESCO
Ministry of Education
37, Damucang Hutong
Xidan
Beijing 100816
People's Republic of China
Tel: (+86-10) 66097170
Fax: (+86-10) 66017912
E-mail: liu10001@yahoo.com or liu@edu.cn

Mr. LIU Wenjiang
Associate Professor
Xingjiang Institute of Ecology and Geography
Chinese Academy of Sciences
Xingjiang
People's Republic of China
Tel: (+86-991) 3835642
Fax: (+86-991) 3835459
E-mail: wjliu@ms.xjb.ac.cn

Dr. LUO Peng
Associate Professor
Chengdu Institute of Biology
Chinese Academy of Sciences
People's Republic of China
E-mail: luopeng@cib.ac.cn

Mr Edmond MOUKALA
UNESCO Beijing Office
Jianguomenwai
Waijiao Gongyu 5-15-3
Beijing 100600
People's Republic of China
Tel: (+86-10) 6532 5790
Fax : (+86-10) 6532 4854
E-mail: e.moukala@unesco.org

Ms. Mercedes OTEGUI ACHA
WWF Mexico Program
Av. Mexico 51
Col. Hipodromo Condesa
Mexico DF
Mexico
Tel: (+52 55) 52 86 56 31 ext. 223
E-mail: moteguwwfmex@compuserve.com.mx

Prof. PEI Shengji
Director
Department of Ethnobotany
Kunming Institute of Botany
Chinese Academy of Sciences
Kunming 650204
Yunnan
People's Republic of China
Tel: (+86-871) 5150660
Fax: (+86-871) 5150227
E-mail: peisj@public.km.yn.cn

Mr Allen D. PUTNEY
Leader of the Task Force on Non-Material Values of Protected Areas of
IUCN's World Commission on Protected Areas (WCPA)
P.O. Box 4046
Incline Village, NV 89450, USA
Tel./Fax (+1-775) 833-3626
E-mail: Allen.Putney@worldnet.att.net

Ms. Lilia PUTNEY
Traditional Healer
Incline Village, NV 89450, USA
Tel./Fax (+1-775) 833-3626
E-mail: Allen.Putney@worldnet.att.net

Ms Hanta RABETALIANA
Vice-President of the World Mountain People Association
APMM Relations Africa
Villa Magali, Ivory Nord
301 Fianarantsoa
Madagascar
Tel/Fax: (+261-2075) 51468
Email: apmm-fia@vitelcom.mg

Prof. P.S. RAMAKRISHNAN
School of Environmental Sciences
Jawaharlal Nehru University
New Delhi – 110 067
India
Tel: (+91-11) 6107676 ext. 4326
Fax: (+91-11) 6172438 or 6169962
E-mail: psr@mail.jnu.ac.in or psrama@yahoo.com

Dr. Thomas SCHAAF
UNESCO Headquarters
Division of Ecological Sciences
Man and the Biosphere (MAB) Programme
7, place de Fontenoy
75352 Paris 07 SP
France
Tel: (+33-1) 45.68.40.65
Fax: (+33-1) 45.68.58.04
E-mail: t.schaaf@unesco.org

Ms SHAO Yan
UNESCO Beijing Office
Jianguomenwai
Waijiao Gongyu 5-15-3
Beijing 100600
People's Republic of China
Tel: (+86-10) 6532 5883
Fax : (+86-10) 6532 4854
E-mail: y.shao@unesco.org

Dr Lhakpa SHERPA
The Mountain Institute (TMI) Asia Regional Office
P.O Box 2785, Bhatbateni
Kathmandu
Nepal
Tel: (+977-1) 41356 / 414237
Fax: (+977-1) 410073
E-mail: lsherpa@mountain.org

Dr. Herwasono SOEDJITO
Programme Director, Indonesian National
Committee for MAB Programme
c/o Herbarium Bogoriense
Research Centre for Biology
Indonesian Institute of Sciences (LIPI)
Jl. Ir. H. Juanda 22, Bogor 16122
West Java
Indonesia
Tel.: (+62-251)-322035
Fax: (+62-251)-325854
E-mail: hsoedjito@yahoo.com
or hsoedjito@biolipi.bogor.net

Dr Norov URTNASAN
Secretary-General
UNESCO National Commission of Mongolia
Government House XI
Revolution Avenue
P.O. Box 38
Ulaan-Baatar
Mongolia
Tel: (+976-11) 32.26.12 or 31.56.52
Fax : (+976-11) 32.26.12 or 32.21.27
E-mail: mon.unesco@mongol.net

Prof. Anoja WICKRAMASINGHE
University of Peradeniya
Department of Geography
Peradeniya
Sri Lanka.
Tel: +94-8-388301 to 5
Fax: +94-8-223015
E-mail: niluwick@slt.lk
(note: Ms Wickramasinghe was unfortunately unable to attend the workshop in person)

Mr XU Youkai
Research Associate
Xishuangbanna Tropical Botanical Garden
Chinese Academy of Sciences
Mengla
Yunnan 666303
People's Republic of China
Tel.: (+86-691) 8715274
Fax: (+86-691) 8715070
E-mail: xyk@xtbg.org.cn

Mr. YANG Zhiwei
Research Associate
Kunming Institute of Botany
Chinese Academy of Sciences
Kunming 650204
Yunnan
People's Republic of China
Tel: (+86-871) 5223236
Fax: (+86-871) 5150227
E-mail: zhiwei@cbik.ac.cn

List of Acronyms

AMMA — Association of Malagasy and African Mountains
ASPACO — Asia-Pacific Cooperation for the Sustainable Use of Renewable Natural Resources in Biosphere Reserves and Similarly Managed Areas – UNESCO
CAS — Chinese Academy of Sciences
CBD — Convention on Biological Diversity
CBIK — Center for Biodiversity and Indigenous Knowledge – China
CBRN — China Biosphere Reserve Network
CECADESU — Center for Environmental Education *(Centro de Educación y Capacitación para el Desarrollo Sustentable)*, SEMARNAT, Mexico
CFCU — the Coastal Forest Conservation Unit within the NMK
CFS — Coast Forest Survey (of the National Museums of Kenya – WWF supported)
CLC — Central Land Council
CNRS — National Center for Scientific Research *(Centre national de la recherche scientifique)*
EABRN — East Asian Biosphere Reserve Network
EOLSS — The Encyclopedia of Life Support Systems (UNESCO project)
ERSEC — Ecological Research for Sustaining the Environment – China
FAO — Food and Agricultural Organization of the United Nations
GOI — Government of Indonesia
GCTE — Global Change and Terrestrial Ecosystems
ICIMOD — International Centre for Integrated Mountain Development
IGBP International Geosphere-Biosphere Program
IGCP — International Geological Correlation Programme
IHP — International Hydrological Programme, UNESCO
IIP — Indigenous Initiative for Peace
INI — National Indigenous Institute *(Instituto Nacional Indigenista)* – Mexico
IOC — Intergovernmental Oceanographic Commission
IRRR International Institute of Rural Reconstruction
IUCN — World Conservation Union (formerly the International Union for the Conservation of Nature)
IUCN-CEESP CMWG — Commission on Environmental Economic and Social Policy Collaborative Management Working Group
LINKS — Local and Indigenous Knowledge Systems – UNESCO
LIPI — Indonesian Institute of Sciences *(Lembaga Ilmu Pengetahuan Indonesia)*
MAB — or UNESCO-MAB — UNESCO's Man and the Biosphere Programme
MNHN — National Museum of Natural History Muséum National d'Histoire Naturelle
MoF — Indonesian Ministry of Forestry
NEPED — Nagaland Environement Protection and Economic Development Project
NGO — Non-Governmental Organization
NMK — National Museums of Kenya
ORPI — Office of the Presidency for Indigenous Peoples, Mexico
PRA — Participating Rapid Assessment

RMTF — Rigoberta Menchu Tum Foundation
SALT — Sloping Agricultural Land Technology
SCOPE — Scientific Committee on the Problems of the Environment
SEMARNAT — Ministry for Environment and Natural Resources *(Secretaría de Medio Ambiente y Recursos Naturales* (Mexico)
SNS — Sacred Natural Sites
TAR — Tibet Autonomous Region
TEK — Traditional ecological knowledge
TNC — The Nature Conservancy
UNDP — United Nations Development Programme
UNEP — United Nations Environment Programme
UNESCO — United Nations Educational, Scientific and Cultural Organization
UNESCO-ROSTCA — Regional Office for Science and Technology for South and Central Asia
UNIDO — United Nations Industrial Development Organization
UNISPAR — University-Industry-Science Partnership – UNESCO programme
WCPA — World Commission on Protected Areas – IUCN
WMPA — World Mountain People Association
WPC — World Parks Congress
WWF — World Wide Fund For Nature