According to legend, the goddess Maria Makiling lives at the top of Mt. Makiling, the highest mountain in Laguna, Philippines. The Tagalogs, the predominant ethnic group in the area, consider her to be the guardian and protector of the mountain. In the legend, she once walked with the lowland people and helped them to meet their needs. She was venerated for providing bountiful harvests and other divine gifts. However, some people abused this kindness, thus incurring her wrath, and she returned to the mountain peak, never to be seen again.

This legend is as much a part of the Tagalog culture as the mountain itself. But its cultural significance may become a thing of the past as degradation of the mountain becomes more serious over the years. The mountain’s fragile resources are endangered by land development, conversion and infrastructure expansion by private landowners and developers, kaingin (shifting cultivation), illegal occupancy, poaching of wildlife and forest products, uncontrolled immigration and a rapidly increasing population.

“T’ve seen a lot of activities on the mountain that endanger its beauty and reduce its resource value,” said Shirley Satioquia, a 43-year-old resident, who
has lived near Mt. Makiling for the past 20 years. “These include illegal cutting of trees, littering inside the forest and dumping of garbage.”

Fifty-one-year-old Alfredo Balagat, a native of the area, was anxious about the burgeoning subdivisions constructed on the lower slopes of the mountain. “Development of subdivisions for residential purposes has contributed to the degradation of the mountain,” he observed. “The constructions not only clear the forest, but also cover the craters that emit the volcanic heat of the mountain. Aside from this, poaching of wildlife and forest products and charcoal-making occur in several areas of the reserve.”

“Despite all these threats,” noted Dr Edwino Fernando, Director of the Makiling Centre for Mountain Ecosystems, “Mt. Makiling remains one of the country’s most important biodiversity areas and most significant forested watersheds. It is a living testimony to people and institutions working together to conserve the country’s natural heritage for Filipinos and for the world.”

The Makiling Centre for Mountain Ecosystems, a unit of the University of the Philippines Los Baños (UPLB), manages the forest directly.

**Mt. Makiling Forest Reserve**

Mt. Makiling’s beauty and ecological importance have been recognized for a long time. In 1910, the government issued Proclamation 106, establishing the Mt. Makiling Forest Reserve. The reserve presently covers 4,224 hectares extending across 80 percent of the mountain. Mt. Makiling Forest Reserve straddles the municipalities of Los Baños, Bay and Calamba (all in Laguna Province) and the municipality of Sto. Tomas (in Batangas Province). The reserve’s primary purpose is to serve as a training laboratory for the advancement of scientific and technical knowledge on the conservation and development of forests and associated ecosystems. The UPLB has been at the forefront of the reserve’s management ever since it established the Philippines’ first school of forestry in 1910.

Dr Emmanuel Abraham, head of the Makiling Centre for Mountain Visitors to Mt. Makiling enjoy the well-maintained hiking trails (courtesy Patrick Durst).
History of a legend: managing the Makiling Forest Reserve

Ecosystems Forest and Watershed Division, identifies five important roles of the forest reserve for human beings:

- protective services and influence;
- education and scientific services;
- psycho-physiological influence;
- consumption of plants, animals and derivatives; and
- source of land and living space.

Mt. Makiling Forest Reserve is particularly important as an educational and research resource, as it provides the setting for studies by many local and international researchers. It also has enormous biological diversity and genetic resources, being home to many plant and animal species — both indigenous and exotic. In 1983, for example, J.V. Pancho, a noted Filipino botanist, reported 949 genera and 2,038 species of flowering plants and ferns representing 225 families in Mt. Makiling and its environs.

Botanical references to Mt. Makiling describe an exceptional diversity of woody plant species, totalling more than the entire number of woody species found in the United States of America. In 1977, the late Dioscoro Rabor, an award-winning zoologist, reported at least 50 species of mammals, 120 bird species, six species of amphibians, 19 types of reptile and several varieties of fish inhabiting the reserve. The area also contains at least 7,000 insect species.

Mt. Makiling Forest Reserve is also a very important watershed, providing water for irrigation, as well as for industrial and domestic purposes. The Mt. Makiling watershed supplies water to five water district authorities, and an indeterminate number of business establishments, government offices and other institutions.

The forest reserve also contains resources supporting geothermal operations that have an electricity generating capacity of 370 megawatts. This constitutes about 17 percent of the generating capacity on the island of Luzon. Mt. Makiling — an inactive volcano — is endowed with numerous natural hot springs, which are the main attraction for local resorts and recreation facilities. About 200 private pools and resorts draw thermal water from the mountain.

The forest reserve’s mysterious legends and captivating natural scenery, as well as the only intact forests within a 65-kilometre radius of Metro Manila, have made Mt. Makiling a favourite recreational site for tourists (local and foreign) and excursionists. Some 120,000 visitors flock to the forest reserve each year. Among the main tourist attractions are the Makiling Botanic Gardens, Mudsprings and Flatrocks.

Ecotourism helps to generate significant financial resources for the reserve. For example, in each of the past three years, the Makiling Botanic Gardens has earned more than US$20,000 from entrance fees. Other sources of income come from the rental of forest reserve facilities and the sale of forest products. These
revenues contribute significantly to the modest budget allocated by the national government for the reserve’s management. However, the combined amount is still barely sufficient to sustain the regular monitoring work done in the forest reserve. As a result, other strategies are needed to protect and conserve the reserve.

**Numerous challenges**

Mt. Makiling Forest Reserve’s protected area status is supposed to ensure that it is free from human occupancy, cultivation and private claims. However, residents within and around the forest reserve largely view the mountain area as an economic resource. Almost 1,000 people — mostly farmers — currently live inside the reserve boundaries, according to UPLB researchers. Farms, providing the main source of livelihood for these residents, now cover approximately 45 percent of the forest reserve’s total area.

Urbanization along the fringes of the reserve further complicates the occupancy problem. The past several decades have seen the growth of various commercial establishments and infrastructure. Development of residential subdivisions on the lower slopes of the mountain puts added pressure on the forest reserve.

“Urbanization itself is not so bad, but the changes that come with it may cause damage to the reserve,” explained Dr. Abraham. “One example is the impact that urbanization has on upstream and downstream water resources, particularly related to wastewater disposal. Other physical impacts include soil disturbances and increased solid wastes. There are also detrimental social impacts such as when land development dislocates landless farmers who then move deeper into the reserve, clearing yet more forest to create new farms.”

The dynamic processes within and around the reserve force its managers to contend with pressures from both agricultural and urban environments. Added to this complexity are the multiple interests of the resident farmers, local government units, people’s organizations, government agencies, lessees, non-governmental organizations, schools, student organizations and the private sector. The differences in their perspectives, mandates, goals and interests can lead to conflict and competition for resources — adding to management challenges.

**Transfer issues**

The management of the forest reserve has been transferred several times since its establishment in 1910. Initially, responsibility for management was vested in the Bureau of Forestry. In 1952, Republic Act 826 re-assigned management responsibility to the Commission of Parks and Wildlife. In 1956, the UPLB’s College of Forestry and Natural Resources sought jurisdiction over the forests to make the reserve a training laboratory for scientific and silvicultural studies. Four years later, in 1960, President Garcia designated the UPLB’s Board of
Regents, as the official administrator of the forest reserve. The transfer was formalized in Proclamation No. 692, which stated that the forest reserve shall “be conserved and preserved as a national park.” However, at the time of transfer, approximately one-third of the reserve’s area had already been encroached by *kaingineros* (slash-and-burn farmers) and squatters.

A sudden change in the forest reserve’s administration occurred in 1987 when jurisdiction was abruptly transferred to the National Power Corporation (NPC) through Executive Order No. 224 issued by President Aquino. The Order set aside a large parcel of land in the provinces of Quezon and Batangas, covering portions of Mt. Makiling and Mt. Banahaw — including the entire Makiling Forest Reserve — for energy generation.

The UPLB countered this administrative development by urging the House of Representatives to return the responsibility for management of the reserve to the university. The university’s efforts were rewarded in 1990, when Republic Act 6967 was signed — giving the university exclusive control of the entire forest reserve.

These frequent changes in administration have inevitably resulted in policy inconsistencies and sometimes ineffective management. Unsurprisingly, only 53 percent of the total land area remained forested by 1989 — the rest had been converted to farms or other land uses.

Earlier approaches governing the forest reserve were highly regulatory and punitive. They did not provide opportunity for social development or for effectively involving stakeholders. For instance, in 1976, President Marcos ordered that farmers who lived in the forest reserve should be forcibly resettled to Quezon Province, some 100 kilometres away. However, without adequate resettlement assistance, and confronted with the infertile soils and the absence of employment opportunities in the resettlement area, most of the relocated people slipped back to Mt. Makiling in less than one year. The expelled farming community quickly re-established itself in the forest reserve and continued with its previous activities.

**Multistakeholder approach**

During the early 1990s, the failure of earlier management strategies triggered an urgent rethink of approaches and led to a multistakeholder or “participatory approach” to forest management — an approach that has since gained wide acceptance, not only in the Philippines, but also in other parts of the world.

The UPLB recognized that it alone could not conserve and protect the reserve. Its new strategy sought partnerships with people’s organizations in the forest reserve. These included *Samahan ng Magsasaka sa Mataas na Lupa ng Lalakay sa Bundok Makiling* and *Samahan ng Bagong Pagasa ng Bagong Silang*. It also sought collaboration with private companies, local government units, non-governmental organizations (including the Laguna Tourism Association and the Rotary Club
of Los Baños) and schools. A variety of programmes were coordinated and implemented by the Makiling Centre for Mountain Ecosystems in collaboration with these and other institutions.

As a result of such partnerships, financial resources for development initiatives were seldom lacking. Each partner became a potential source of funds and non-monetary inputs.

“Collaborative partners usually implement activities themselves. For instance, they may bring their employees to plant trees, and staff from the university will simply coordinate and supervise them. The advantages of this approach are that complex fund transfers are avoided and the university does not have to use its own resources for rehabilitation projects. Furthermore, the people who take part in the activities gain experiences that they long value,” said Dr Abraham.

**Forest management measures**

The 1990s were a good decade for the Mt. Makiling Forest Reserve in terms of collaborative work. During this period, a number of private organizations provided funds for reforestation projects, while local farmer organizations provided hired labour and forest protection services. Private sponsors included Novartis (a biological and chemical company based in Switzerland), Surigao Development Corporation, the Philippine Wood Producers Association and Sterling Health Incorporated. These organizations funded tree-planting and watershed rehabilitation projects in the forest reserve. To date, approximately 45 hectares have been replanted, with 70 to 90 percent survival rates. The choice of species has shifted from introduced to indigenous trees, especially species of dipterocarps that once dominated the original forests.

In addition to tree planting, Mt. Makiling stakeholders also engage in other forest management activities including land-use assessment and planning, watershed protection, biodiversity conservation and restoration, and protection and management of water sources and distribution systems.

The Makiling Centre for Mountain Ecosystems is tireless in its efforts to seek the participation of partners in the rehabilitation of denuded land. It has also made education a priority — especially to increase forestry expertise and the level of awareness of people concerning the importance of conserving the forest reserve. This is done mainly through various forestry certificate and degree programmes ranging up to doctoral level. The College of Forestry and Natural Resources implements these programmes.

**Training laboratory**

The College of Forestry and Natural Resources has trained 6 684 graduates in forestry since 1912. It is widely recognized as the premier forestry school in the Philippines, and as one of the leading institutions in the region.
“It was while doing practical fieldwork in the forest reserve that I first learned and appreciated the basic concepts and importance of watershed management,” recollected Dr Rex Victor Cruz, a 1978 forestry graduate and now a leading national expert in watershed management. “This exposure encouraged me to pursue a higher degree in forestry and to build a professional specialization around forests and watersheds. It was also in the forest reserve that my eyes were first opened to the vast diversity of plants and animals in a humid tropical forest. At close range, I came to understand the real interactions between people and the forests.”

Mt. Makiling Forest Reserve is set apart from many other forests by the sheer volume of research conducted within the reserve — by both local and international scientists. Aside from providing additional information and knowledge on various features of the reserve, these studies also impart insights on how to continuously improve management. Research has also led to the development of models for management that have subsequently been applied in forest ecosystems throughout the Philippines.

Outdoor recreation education

The primary purpose of the forest reserve, however, extends beyond the confines of academia, into extension efforts aimed at educating other sectors of society — and particularly young people.

As early as 1973, the College of Forestry and Natural Resources, through the Department of Forestry Extension, began implementing an Outdoor Recreation Education programme in collaboration with the Department of Education, Culture and Sports in the nearby provinces of Batangas and Laguna. Conducted during the summer months, the programme educated young people on the value of spending their vacation time outdoors and in natural environments, as well as the proper use of outdoor recreational areas. The programme provided schoolchildren with new perspectives and knowledge about the importance of the environment.

In 1998, the Makiling Centre for Mountain Ecosystems expanded the Outdoor Recreation Education programme (which ended in 1996) by launching the Environmental Education Program. The new programme expands coverage to elementary school administrators and teachers at Grades V and VI, as well as students.

The core components of the Environmental Education Program are:

- information;
- education;
- communication;
- curriculum development and integration of environmental concepts to other subjects taught in Grades V and VI;
conservation of the Mt. Makiling Forest Reserve and other mountains;

establishment of forest parks; and

monitoring and evaluation.

The programme was initially run for 13 schools, but its success led to its expansion to cover 113 schools, with the participation of 130 school officials, 150 teachers and 20,000 pupils. More schools are eager to join the programme, and further expansion is anticipated.

In recognition of its exemplary performance, the College of Forestry and Natural Resources cited the Environmental Education Program as the Outstanding Extension Program of the College in 2003.

Monitoring and law enforcement system

To provide adequate protection to its forests, the Mt. Makiling Forest Reserve uses a progressive system of monitoring and law enforcement. Efforts are first made to resolve problems associated with illegal tree felling, poaching of wildlife and forest encroachment through dialogue and moral persuasion. Persistent violators, however, are arrested and prosecuted. “Some poachers are imprisoned, while other cases are settled more amicably,” indicated Dr. Abraham.

A number of laws and policies have been issued for the protection of the reserve. Presidential Decree 330, for instance, defines timber smuggling or illegal cutting of logs from public forests and forest reserves as qualified theft. Memorandum No. 080, S. 2000, prohibits the construction of huts, houses or similar structures inside the forest reserve. Forest officers are assigned within the reserve to enforce these rules and regulations and to conduct regular forest patrols.

Flaws

Although a multistakeholder approach has generally proven effective in managing Mt. Makiling Forest Reserve, it is not flawless. The implementation of participatory processes sometimes introduces problems that cannot be ignored. Identifying stakeholders and their “stakes” in the forest is a primary concern, since it is not only the benefits that are shared, but also responsibilities. The means and modes of participation also need to be made clear to all parties. To avoid conflicts, efforts are made to communicate with various stakeholders through meetings, workshops and other extension activities.

To formalize the partnerships between the UPLB and other stakeholders, several Memoranda of Agreement have also been signed. One example is a memorandum signed between the university and the Regional Office of the Department of Education Culture and Sports (signed on April 4, 2001). This
agreement governs the implementation of an Environmental Learning and Conservation Project designed to promote environmental awareness by conducting experiential learning activities for students. Recognizing the importance of conservation and protection of the watershed within the forest reserve, the university and the Laguna Tourism Association implemented an agreement (signed in January 2001) to regulate the erection of signs and to support a monitoring station along the boundaries of the forest reserve.

**Conclusion**

Not all efforts to conserve and protect the Mt. Makiling Forest Reserve have been successful. Nonetheless, the reserve has been maintained and improved for almost a century due to the commitment of its managers to uphold its primary objective, that is, to serve as a training laboratory for the advancement of scientific and technical knowledge on natural resources’ conservation. This effort is strengthened by the participation of various stakeholders in conserving and rehabilitating the forest, and by the high level of awareness of local people concerning the importance of the reserve. Threats from encroachment, urbanization and surging populations have not deterred the pursuit of this primary objective. The management experiences at the forest reserve add to the Mt. Makiling legend.

In summarizing his perspectives, Dr Fernando said: “I would like to regard ‘Makiling’ as a brand name — not just for the mountain’s beauty and the maiden lass of the legendary tale — but also for the quality of the forest reserve and its environment. The name ‘Makiling’ should evoke the reserve’s many economic, aesthetic and ecological benefits, and its long academic and scientific tradition. Its conservation and protection are of the utmost importance, while its demise would be a great tragedy for us all.”

**About the authors**

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In search of excellence

Pre-harvest inventory and tree felling, Nakavu Forest, Fiji (courtesy SPC/GTZ Pacific-German Regional Forestry Project).