

## Ecotourism Potential of the Bacman Geothermal Production Field in Sorsogon City, Philippines

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**Keywords:** geothermal, environmental stewardship, sustainable management, community-based ecotourism, *Acerodon jubatus*

### ABSTRACT

The 25,000-hectare geothermal reservation in Luzon, where the Energy Development Corporation (EDC) operates the 150-MWe Bacon Manito Geothermal Production Field (BGPF), not only hosts one of the country's geothermal powerhouses but is also a budding ecotourism destination. It boasts of natural geological wonders such as the Inang Maharang Mud Pool, Naghaso Boiling Lake, Parong Hot Springs and Botong Twin Falls. The reservation is also a sanctuary of the world's largest remaining fruit bats, the *Acerodon jubatus*, found only in the Philippines — a clear proof that energy development activities and environmental preservation are not mutually exclusive. Thus, EDC has recognized eco-tourism as a sustainable conservation tool that could promote protection efforts and, at the same time, provide alternative livelihood opportunities to its steward communities. The Company endeavors to develop the capabilities of these communities in handling ecotourism projects, in keeping with its thrusts on environmental protection and good corporate citizenship.

### 1. INTRODUCTION

The Philippines is regarded as one of the top 25 biodiversity hotspots in the world in view of its high percentage of endemic plants and animals which are threatened by extinction (National Ecotourism Strategy, 2002). This has drawn much attention from the international front, especially among conservationists, both in terms of heightening awareness on the importance of biodiversity conservation, and in finding solutions and generating funds to preserve the country's dwindling biological resources.

As part of government's efforts to highlight the country's diverse natural and cultural resources, Executive Order (EO) No. 111 was issued on June 17, 1999 establishing the guidelines for ecotourism development in the Philippines. Pursuant to this EO, a National Ecotourism Strategy (NES) was formulated to provide an integrated management plan for the development of ecotourism and ecotourism sites in the country. The NES rested on the following principles: 1) sustainable management of natural and cultural resources; 2) environmental education and conservation awareness; 3) empowerment of local communities; and 4) development of products that will satisfy the visitors' needs. All these aimed to position the Philippines as a globally competitive ecotourism destination (National Ecotourism Strategy, 2002).

#### 1.1 Ecotourism

Ecotourism, also known as ecological tourism, is defined as responsible travel to natural areas that conserves the

environment and improves the welfare of local people (TIES, 1990). It is a form of tourism that appeals to the ecologically and socially conscious, as well as to nature seekers. Generally speaking, ecotourism focuses on local culture, wilderness adventures, volunteering, personal growth, and learning new ways to live on the planet. It typically involves travel to destinations where flora, fauna, and cultural heritage are the primary attractions.

#### 1.2 Potential Ecotourism Sites

With its acquired ecological value, protected areas and forested natural parks, especially those found in the tropics and in less-developed countries, contain many of the world's best ecotourism attractions. These attractions may host rare or endemic species of flora or fauna and abundant wildlife, have high indices of species diversity, unusual or spectacular geomorphological formations, or unique historic or contemporary cultural manifestations in a natural context (Drumm *et al.*, 2004).

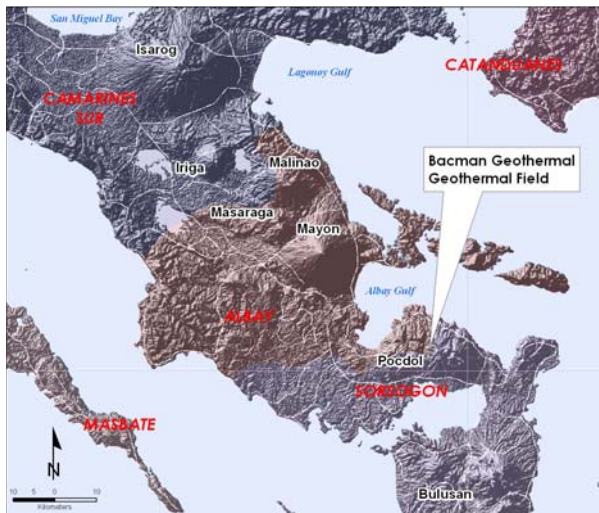
As early as 1983, the Philippine National Oil Company (PNOC) thru its subsidiary, the Energy Development Corporation (EDC), has been deputized by the then Ministry of Energy, through Ministry Order 83-06-15, to administer geothermal reservations in protected forested areas in the country. Alongside its principal business of harnessing geothermal energy for power generation, it also engages its host communities in protecting and conserving nature's bounties within vast forest lands that it manages in different parts of the country.

With the growing international focus on environmental issues, EDC recently recognized the potential of ecotourism as an instrument that could sustainably generate funds for the conservation of biological and cultural diversities and mobilize local communities to protect the environment. Effectively, this strategy is expected to achieve the twin goals of sustainable ecological resource management and community empowerment through livelihood generation and capability-building activities. In fact, many conservation organizations and other countries see ecotourism as a means to preserve and develop remote and undeveloped areas (Lash, undated).

### 2. THE GEOLOGIC ECOTOURISM FEATURES OF BGPF

EDC's BGPF is a promising ecotourism site. Strategically located in the southernmost part of the Bicol region, this 150-MWe geothermal facility is one of the Company's five operating projects. Covering a 25,000-hectare reservation area, BGPF provides an alternative view of the famous perfect cone-shaped Mount Mayon, while the Albay Gulf and Sorsogon Bay offer a scenic backdrop for the steam field. Thus, BGPF is not only a geothermal showcase, but a willing refuge for ecotourism enthusiasts and nature lovers well.

Being part of the so-called Circum-Pacific Ring of Fire, volcanoes and hot springs are typical geologic features around the Philippine archipelago. The Bicol region is part of what geologists call the Bicol Arc, the northwest-trending chain of Late Tertiary-Quaternary eruptive centers associated with the subduction of the Philippine Sea Plate along the northern edge of the Philippine Trench. Along this geologic arc is the Pocdol volcanic range that runs midway along the two (2) active volcanoes of the Bicol region: Mounts Mayon and Bulusan (Figure 1).



**Figure 1: The active volcanoes located along the southernmost part of the Bicol region, Philippines.**

Apart from the active volcanoes, other similar volcanic features are found along the Pocdol volcanic range. These include hot springs and mud springs, which serve as heat outlets for the untapped steam energy under the earth's crust.

### 2.1 Hydrothermal Springs

The steam beneath the earth's surface rises, exits through the crust's crevices, and heats up the overlying bodies of water to produce what is called a hydrothermal spring. The presence of numerous springs in an area is a clear manifestation of geothermal activity underneath. Three (3) notable hydrothermal springs are located inside the BGPF geothermal reservation area, as follows:

**Inang Maharang Mud Pool.** This is located in the vicinity of Barangay Nagotgot, approximately three (3) kilometers from the BGPF facility. Geologists reported this volcanic feature as the former Mount Pocdol crater that erupted a long time ago, subsided and formed fumaroles resembling one big mud pool.

Covering an estimated area of 1,000 square meters, this volcanic mud pool could reach a temperature as high as 140°C. Local residents and neighboring farmers take advantage of the pool's hot temperature for their domestic tasks (*i.e.* cooking/heating food items, chicken dressing). Mud packs and other therapeutic applications could also be tapped from this pool.

**Naghaso Boiling Lake.** This geologic feature is located in the hidden forest of Barangay Hulugan, Manito, Albay.

Reaching a temperature of up to 180°C (much higher than the boiling point of water), the lake environment is detrimental to any fish and other aquatic organisms.

**Parong Hot Spring.** This natural spring is located along the shoreline of Barangay Pawa, Manito, Albay. With a temperature of 40-80°C, this water body is suitable for leisure bathing and other therapeutic applications.

### 2.2 Botong Twin Falls

Another unique natural wonder is the Botong Twin Falls located in the heart of the BGPF geothermal reservation. The twin falls is known for its bluish green water cascading beside a crystal clear waterfall, converging into the ice-cold lagoon below. The former is unsuitable for drinking due to its sulfuric composition, while the latter is a spring mineral water that can be used for leisure bathing and as a source of fresh drinking water.

## 3.0 THE MAGNIFICENT PHILIPPINE FLYING FOXES OF BGPF AND EDC'S CONSERVATION EFFORTS

As a result of its complex geological past and evolutionary history, the Philippines harbors a remarkable assemblage of terrestrial mammalian fauna, with more than a hundred endemic species found nowhere else in the world. Each major Philippine island contains a unique set of mammalian fauna, with 90% of the native non-flying mammals exclusively distributed in the island of Luzon (Alviola, 2007).

In the southernmost part of Luzon, a unique group of nocturnal mammals--specifically the large fruit bats or flying foxes--can be observed just several meters from the Botong Twin Falls. The site houses the golden-crowned flying fox (*Acerodon jubatus*) and the large flying fox (*Pteropus vampyrus*), two of the world's largest bat species, with the former found only in the Philippines. Their presence was officially verified in June 2006 during the wildlife survey conducted by the University of the Philippines Los Baños (UPLB) Museum of Natural History team, headed by their resident mammalogist P. A. Alviola.

During the survey, a total of nine (9) bat species were verified within the reservation boundaries. Aside from the two (2) large flying foxes mentioned above, another lesser species of flying fox, the Mottled-wing flying fox, was found. The mist-netting efforts of the survey resulted to the documentation of four (4) other species of small fruitbats: Common short-nosed fruitbat, Philippine pygmy fruitbat, Dagger-toothed flower bat, and the Musky fruitbat. Also, the cave survey resulted to the capture of two (2) insectivorous bats: the Philippine forest horseshoe bat and the Common bent-winged bat (Alviola, 2007).

### 3.1 The Golden-Crowned Flying Fox

*Acerodon jubatus* (Eschscholtz, 1831). Also known as the golden-crowned flying fox, *Acerodon jubatus* (Figure 2) is a globally-threatened bat species found only in the Philippines. It is distributed throughout the country, except in the islands of Palawan and Batanes, and is among the largest bats in the world (Heaney, *et al.* 1998). It weighs almost 1,200 grams (about three pounds) and has a wingspan that reaches more than five feet. This flying fox ranks second to the large flying fox (*Pteropus vampyrus*), which has the longest wingspan for any bat in the world.



**Figure 2: The golden-crowned flying fox, *Acerodon jubatus*, roosting along the BGPF Botong Twin Falls area.**

The essential habitat of the golden-crowned flying fox includes the primary and secondary lowland forests reaching an elevation of up to 1100 masl (meters above sea level). Each night, these large fruit bats fly 40 kilometers or more, feeding on ripe figs and other forest-dwelling fruit trees. Playing their role as natural pollinators, these bats are an integral part of the lowland forest ecosystem since the consumed fruit seeds travel quickly through their digestive tracts which, in turn, are defecated during flight (Massicot, 2005).

The population of these bats has severely declined in the past years due to habitat destruction and heavy hunting for food consumption. Since 1994, the International Union for the Conservation of Nature (IUCN) has classified this species under the endangered status (IUCN Red Data Book, 1994).

### 3.2 The Large Flying Fox

*Pteropus vampyrus* (Linnaeus, 1758). Also known as the large flying fox, this species occurs from Indochina to the Lesser Sundas. It is widespread in the Philippines, except in the Batanes and Babuyan regions (Heaney, *et al.* 1998). Its population has declined substantially in the last decade due to intensive hunting in many parts of the country, and is also classified under the endangered status.

This large fruit bat has the widest wingspan, reaching more than 1.7 meters. It ranks second to the golden-crowned flying fox in terms of body mass. Although these bats reside in primary lowland forests reaching to 1250 masl, they are also reported and documented to have foraged the agricultural areas for fruits.

### 3.3 EDC's Conservation Efforts

Both flying foxes above were encountered roosting extensively alongside each other inside the deep heavily forested gully of the BGPF reservation. Although already classified under endangered status due to the destruction of their natural habitat during the early 1990s, these flying foxes have been spotted in large groups, ranging between 1,500 to 2,000 individuals, along the recently established sanctuary (Alviola, 2007). This is a clear proof that energy development activities and environmental/wildlife preservation are not mutually exclusive.

Recognizing the rare mammalian assemblage in the area, the EDC management declared the surrounding area of Botong Twin Falls site as a bat sanctuary and implemented a "NO HUNTING POLICY" inside the whole BGPF geothermal reservation last June 2006. As part of EDC's

watershed management plan, fruit bearing trees identified from previous studies (*e.g.* *Ficus sp.*) as food source of these flying foxes were planted along the sanctuary area to enhance their natural habitat.

Information, education and communication (IEC) activities for the conservation of these endangered flying foxes are conducted every year during the Environment Month Celebration in Sorsogon City. The activity includes the distribution of promotional t-shirts, establishment of highway billboards, and the publication in local newspapers of articles advocating for their protection.

Aside from the establishment of the bat sanctuary and the implementation of the hunting ban, BGPF has also initially identified other possible components of its eco-tourism project. With the site's natural slopes and mounds ideal for hiking/trekking, rappelling and other outdoor sports, a one-hectare campsite complete with accessories and amenities has already been established in the area. For three (3) years now, BGPF has been hosting an annual Energy Camp, a two-week, youth-oriented summer activity for selected high school students that focuses on environmental protection and conservation (Figure 3).



**Figure 3: Selected high school students during the 2007 BGPF Annual Energy Youth Camp.**

## 4.0 ECOTOURISM IN BGPF AND FUTURE COMPANY MANAGEMENT PLANS

According to the World Travel and Tourism Council (WTTC), tourism is the largest industry in the world, contributing an estimated US\$5.49 trillion in the global economy in 2004 and ecotourism is the largest growing sector of this industry, with about 40 to 60% of the 528.4 million international tourists being nature lovers (TIES, 1990).

Recognizing the compatibility of ecotourism principles with EDC's integrated environmental management plan for all its geothermal reservations (especially for BGPF and its unique natural wonders), the Company intends to enhance its existing watershed management strategies and to continue promoting BGPF as an ecotourism site. The ecotourism potential of BGPF is immense, considering that mechanisms to ensure its success are mostly in place.

### 4.1 Ecotourism and Community Participation

For ecotourism projects, the institutionalization of community participation in the various phases of project planning, development, implementation and monitoring enable local communities to have a stake in or ownership of these projects, making them appreciate the important economic value of the environment. This, in turn, causes them to care more for the environment and the resources found therein, transforming them to become the foremost conservationists in the area. Indirectly, this empowerment leads to the promotion of environmental education and



ethics among communities, which is an essential ingredient for any ecotourism program to become effective.

The conscious effort of local communities to safeguard the environment leads to the conservation of the existing biological resources in the ecosystem as well as the preservation of cultural diversity, contributing to the richness or attractiveness of the area as an ecotourism site.

#### 4.2 Ecotourism and Livelihood Development

Understanding that biological resources attract tourists and ecotourism activities provide them with livelihood and other economic opportunities, local communities themselves promote the sustainable use of these resources. This shows the great potential of ecotourism as a source of livelihood opportunities for communities with ecotourism sites.

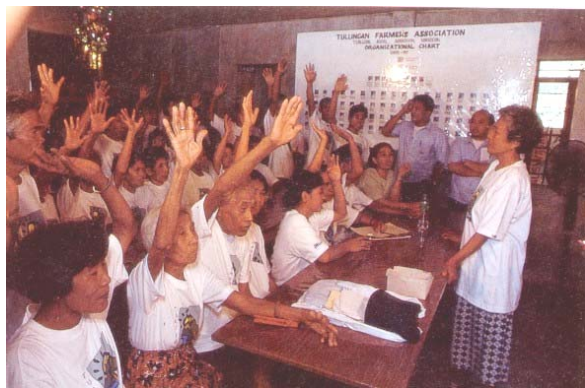
Working with communities, ecotourism can protect ecosystems by preventing erosions, preserving biological integrity, promoting conservation education and providing economic incentives for sustainable use (Lash, undated). Kusler in 1990 stated that since ecotourism is resource-based, protection of natural and archaeological resources is essential for sustainable ecotourism.

#### 4.3 Ecotourism and EDC

Consistent with its corporate social responsibility (CSR) initiatives, the Company acknowledges the potential of a community-based ecotourism strategy as a sustainable conservation tool that will promote protection efforts and, at the same time, provide alternative livelihood opportunities to its steward communities.

In the long run, the Company endeavors to build the capabilities of these communities in handling ecotourism projects, in keeping with its thrusts on environmental protection and good corporate citizenship.

In 2004, EDC revitalized its CSR program with the creation of the Community Partnerships Department (CPD). The CSR program — along with the watershed management activities of the Environmental Management Department (EMD) — provides a boost to the ecotourism potentials of geothermal reservations like BGPF where endemic flora and fauna are abundant in the natural environment. Furthermore, empowering local communities by enlisting their participation in every phase of the project paves the way for a sustainable management of the biological resources and cultural diversity in the area (Figure 4).



**Figure 4: Social preparation for EDC's CSR projects at BGPF.**

In September 2005, the Department of Tourism (DOT) recognized the potentials of BGPF's natural wonders and

included it in the list of ecotourism destinations in the country. With this recognition and in anticipation of the influx of tourists in the reservation, the BGPF Management is now working with concerned agencies in the Bicol region to finalize visiting protocols for visiting tourists. Corollarily, it has proposed the implementation of a Wildlife Conservation Project (which involves the establishment of a butterfly garden and deer farm, among others) to further enrich biodiversity in the reservation. A multi-sectoral committee will be created to strategize, plan, and monitor the BGPF ecotourism management plan in the coming years.

#### 5.0 CONCLUSIONS

The 25,000-hectare Bacon Manito Geothermal Production Field (BGPF) is part of EDC's source of renewable steam energy. This geothermal reservation is also blessed with various geologic wonders and is a natural haven of the world's largest fruit bats, the *Acerodon jubatus*. With its continuing environmental and watershed management efforts, the Company has demonstrated that energy development and environmental preservation are not mutually exclusive and has even showcased that geothermal reservations have great potentials to become ecotourism sites.

Community-based ecotourism, such as the one that can be developed in BGPF, is a sustainable conservation tool that can effectively promote environmental protection efforts and provide alternative livelihood opportunities to its steward communities.

The challenge ahead is to develop the capability of these steward communities to become local entrepreneurs who will be able to sustainably manage the impacts of ecotourism on the environment. It is imperative for local communities to have enhanced skills to produce globally competitive ecotourism products for quality visitor experience. Moreover, it must be ensured that the economic benefits of such ecotourism activities redound to the local communities.

In BGPF, with the assistance of other concerned agencies, EDC endeavors to achieve a balance between the income-generating potential of ecotourism projects and the sustainable management of resources important for ecotourism, in keeping with its thrusts on environmental protection and good corporate citizenship. If this is achieved, BGPF will indeed be a living testimony of people, technology and nature working together in harmony.

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