

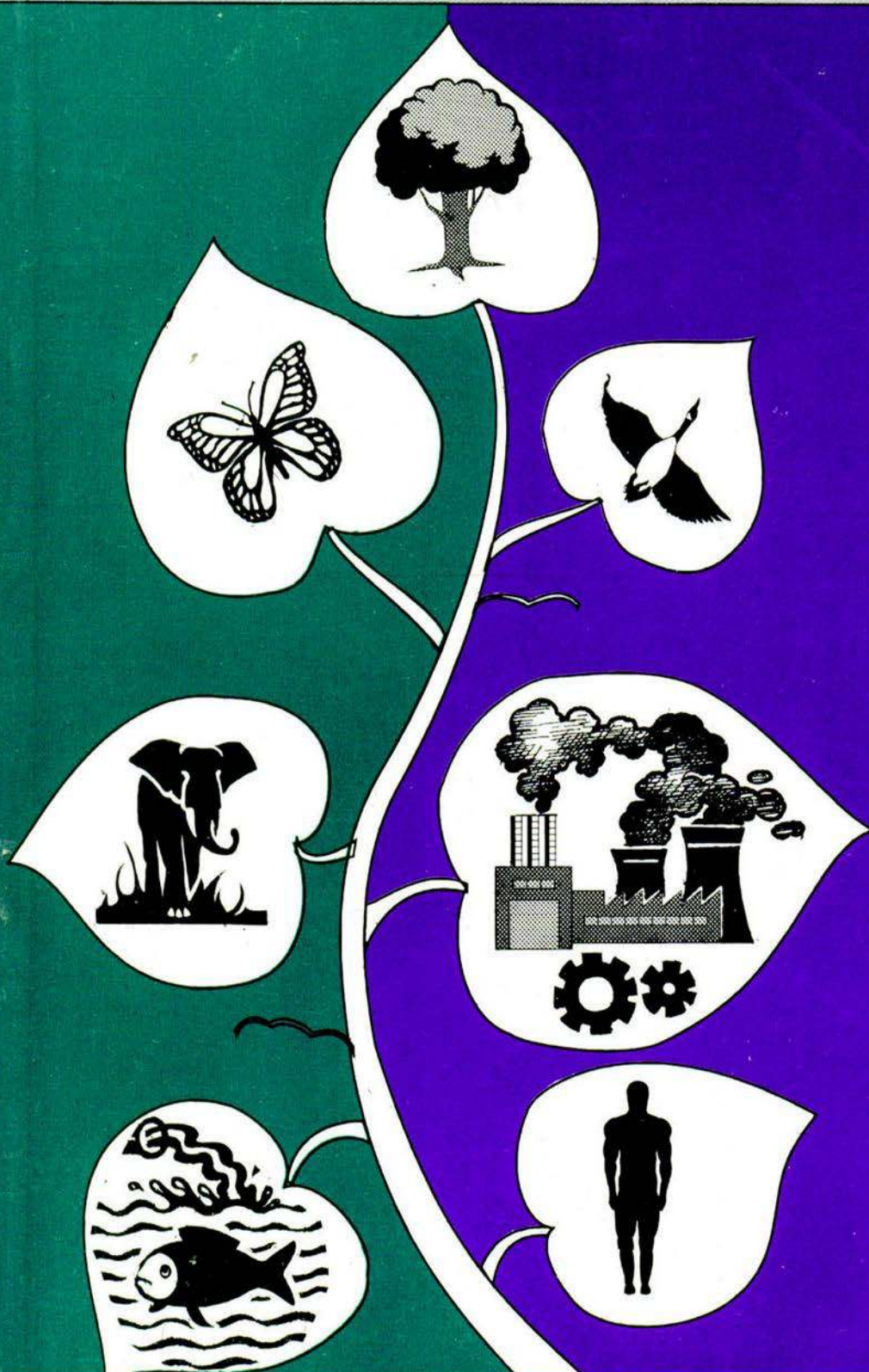
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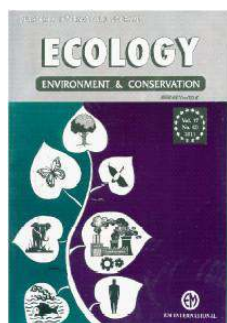
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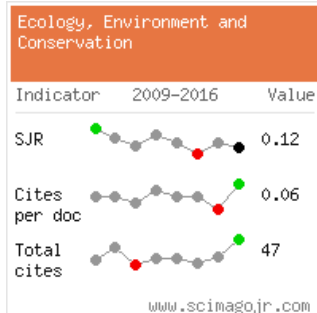
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- [Vol 23, Sept. Suppl. Issue 2017](#)
- [Vol 23, Issue 3, 2017](#)
- [Vol 23, Issue 2, 2017](#)
- [Vol 23, Issue 1, 2017](#)
- [Vol 23, Feb 2017 Suppl. Issue](#)
- [Vol 22, Dec 2016 Suppl. Issue](#)
- [Vol 22, Issue 4, 2016](#)
- [Vol 22, Sept. Suppl. Issue, 2016](#)
- [Vol 22, Issue 3, 2016](#)
- [Vol. 22, June Suppl. Issue 2016](#)
- [Vol 22, Issue 2, 2016](#)
- [Vol. 22, April Suppl. Issue 2016](#)
- [Vol 22, Issue 1, 2016](#)
- [Vol 21, Issue 4, 2015](#)
- [Vol. 21 Dec. 2015 Suppl. Issue](#)
- [Vol. 21 Nov. 2015 Suppl. Issue](#)
- [Vol 21, Issue 3, 2015](#)
- [Vol. 21 Suppl. Issue August 2015](#)
- [Vol 21, Issue 2, 2015](#)
- [Vol 21, Suppl. Issue June 2015](#)
- [Vol 21, Issue 1, 2015](#)
- [Supplement Issue, Dec. 2014](#)
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[Vol. 19 Issue 03, 2013](#)
[Vol. 19, Issue 02, 2013](#)
[Vol. 19, Issue 01, 2013](#)
[Vol.18, Issue 04, 2012](#)
[Vol.18, Issue 3, 2012](#)
[Vol.18, Issue 2, 2012](#)
[Vol.18, Issue 1, 2012](#)
[Vol.17, Issue 4, 2011](#)
[Vol.17, Issue 3, 2011](#)
[Vol.17, Issue 2, 2011](#)
[Vol.17, Issue 1, 2011](#)
[Vol.16, Issue 4, 2010](#)
[Vol.16, Issue 3, 2010](#)
[Vol.16, Issue 2, 2010](#)
[Vol.16, Issue 1, 2010](#)
[Vol.15, Issue 04, 2009](#)
[Vol.15, Issue 03, 2009](#)
[Vol.15, Issue 02, 2009](#)
[Vol.15, Issue 1, 2009](#)
[Vol.14, Issue 04, 2008](#)
[Vol.14, Issue 2-3, 2008](#)
[Vol.14, Issue 2-3, 2008](#)
[Vol.14, Issue 1, 2008](#)
[Vol.14, Issue 2-3, 2008](#)
[Vol.13, Issue 04, 2007](#)
[Vol.13, Issue 2, 2007](#)
[Vol.13, Issue 1, 2007](#)
[Vol.12, Issue 4, 2006](#)
[Vol.12, Issue 3, 2006](#)
[Vol.12, Issue 2, 2006](#)
[Vol.12, Issue 01, 2006](#)
[Vol.12, Issue 1, 2006](#)
[Vol.11, Issue 3,4, 2005](#)
[Vol.11, Issue 2, 2005](#)
[Vol.11, Issue 1, 2005](#)
[Vol.10, Issue 04, 2004](#)
[Vol.10, Issue 03, 2004](#)
[Vol.10, Issue 02, 2004](#)
[Vol.10, Issue 01, 2004](#)
[Vol.09, Issue 04, 2003](#)
[Vol.09, Issue 03, 2003](#)
[Vol.09, Issue 02, 2003](#)
[Vol.08, Issue 04, 2002](#)
[Vol.08, Issue 03, 2002](#)
[Vol.08, Issue 01, 2002](#)
[Vol.07, Issue 04, 2001](#)
[Vol.07, Issue 03, 2001](#)
[Vol.07, Issue 02, 2001](#)
[Vol.07, Issue 01, 2001](#)
[Vol.06, Issue 04, 2000](#)
[Vol.06, Issue 03, 2000](#)
[Vol.06, Issue 02, 2000](#)
[Vol.06, Issue 01, 2000](#)
[Vol.05, Issue 04, 1999](#)
[Vol.05, Issue 03, 1999](#)
[Vol.05, Issue 02, 1999](#)
[Vol.05, Issue 01, 1999](#)
[Vol.04, Issue 1,2, 1998](#)
[Vol.03, Issue 3,4, 1997](#)
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[Vol. 21 Dec. 2015 Suppl. Issue](#)

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[Vol 20, Issue 4, 2014](#)

[Vol 20, Issue 3, 2014](#)

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[Vol. 19 Issue 04, 2013](#)

[Vol. 19 Issue 03, 2013](#)

[Vol. 19, Issue 02, 2013](#)

[Vol. 19, Issue 01, 2013](#)

[Vol.18, Issue 04, 2012](#)

[Vol.18, Issue 3, 2012](#)

[Vol.18, Issue 2, 2012](#)

[Vol.18, Issue 1, 2012](#)

[Vol.17, Issue 4, 2011](#)

[Vol.17, Issue 3, 2011](#)

[Vol.17, Issue 2, 2011](#)

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[Vol.14, Issue 04, 2008](#)
[Vol.14, Issue 2-3, 2008](#)
[Vol.14, Issue 2-3, 2008](#)
[Vol.14, Issue 1, 2008](#)
[Vol.14, Issue 2-3, 2008](#)
[Vol.13, Issue 04, 2007](#)
[Vol.13, Issue 2, 2007](#)
[Vol.13, Issue 1, 2007](#)
[Vol.12, Issue 4, 2006](#)
[Vol.12, Issue 3, 2006](#)
[Vol.12, Issue 2, 2006](#)
[Vol.12, Issue 01, 2006](#)
[Vol.12, Issue 1, 2006](#)
[Vol.11, Issue 3,4, 2005](#)
[Vol.11, Issue 2, 2005](#)
[Vol.11, Issue 1, 2005](#)
[Vol.10, Issue 04, 2004](#)
[Vol.10, Issue 03, 2004](#)
[Vol.10, Issue 02, 2004](#)
[Vol.10, Issue 01, 2004](#)
[Vol.09, Issue 04, 2003](#)
[Vol.09, Issue 03, 2003](#)
[Vol.09, Issue 02, 2003](#)
[Vol.08, Issue 04, 2002](#)
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[Vol.08, Issue 01, 2002](#)
[Vol.07, Issue 04, 2001](#)
[Vol.07, Issue 03, 2001](#)
[Vol.07, Issue 02, 2001](#)
[Vol.07, Issue 01, 2001](#)
[Vol.06, Issue 04, 2000](#)
[Vol.06, Issue 03, 2000](#)
[Vol.06, Issue 02, 2000](#)
[Vol.06, Issue 01, 2000](#)
[Vol.05, Issue 04, 1999](#)
[Vol.05, Issue 03, 1999](#)
[Vol.05, Issue 02, 1999](#)
[Vol.05, Issue 01, 1999](#)
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THE PERFORMANCE OF CLAY AT DIFFERENT MOISTURE CONTENTS FOR ENVIRONMENTAL PROTECTION AGAINST GAMMA RAY

Hajar Share Isfahani, Sayyed Mahdi Abtahi, Mohammad Ali Roshanzamir and Sayyed Mahdi Hejazi

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Maryam Ilanlou

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ANALYSIS OF THE SYSTEM OF SUPPORT OF COOPERATION OF THE RUSSIAN AND EUROPEAN COMMUNITIES IN THE FIELD OF THE ENVIRONMENT, INCLUDING CLIMATE CHANGE

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THE EFFECT OF GROWTH STIMULATORS ON SWEET-CLOVER YIELD AND QUALITY AND ITS GERMINATION IN LABORATORY AND FIELD CONDITIONS

Miras Nurbaevich Suraganov¹, Sansyzbay Koysybayuly Memeshov², Hristina GeorgievaYancheva³ and Synar Nurlibekovna Durmekbayeva²

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DEVELOPMENT OF THE BIOLOGICAL METHOD OF PROTECTING COTTON FROM PESTS IN SOUTH KAZAKHSTAN

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IN VITRO ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF CYANOBACTERIA ISOLATED FROM COCHIN ESTUARY, INDIA

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Biodiversity conservation as ecotourism attraction— social and ecological perspectives

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ABSTRACT

Nantu-Boliyohuto Wildlife Reserve in Gorontalo is a conservational area that has 204 types of plants, 20 types of wild animals, and 56 types of birds. This research is aimed at reviewing potential attractions of the biodiversity of Nantu Boliyohuto Wildlife Reserve as the object and attraction of the natural tourism. The data collection was carried out by literature review, direct observation, and interview. The research results show that the potential attractions of the Nantu Boliyohuto Wildlife Reserve biodiversity as the object and attraction are: birds observation, wild life attraction, botanical beauty and unique attraction, forest tour, river tour, natural panorama tour, photo hunting, and educational tour.

Key words : Biodiversity, Ecotourism, Social, Ecological, Nantu-Boliyohuto

Introduction

One of the tourism destination areas in Gorontalo Province as outlined in the Tourism Strategy and Development of Gorontalo Year 2005 is the Nantu-Boliyohuto Wildlife Reserve. Administratively, it is located in the three districts of Gorontalo, Boalemo, and Northern Gorontalo. It was first established as the Wildlife Reserve Area in 1999, covering the landmass area of around 31.215 Ha. The area is then expanded to 51.507,33 Ha by a decree of the Forestry Minister No. 325/ForestryMinister-II/2010. In tourism planning and development, tourism object and attraction are the important elements to attract more tourists.

Nantu-Boliyohuto Wildlife Reserve has specific characteristics, e.g. diversity and uniqueness of fauna to be protected and conserved as the natural resources and culture globally, which can bring an added value to the conservation of the natural habi-

tation as well as the existing flora and fauna, and can maintain the balance of the surrounding areas, which can be utilized for research, science, education, cultivation-sustaining, tourism, and recreation. The aims of the management can be grouped into four main aspects of conservation, research, education, and tourism.

Nantu-Boliyohuto is a part of Wallacea Bio-Geography that is rich with biodiversity, a mixing-zone of Asian-Australian flora and fauna. Generally, the area can be categorized into the lowland-rain forest type. The plants are greatly dominated by the high-standing trees with the dense tops. Most of them are from the groups of *Anacardiaceae*, *Flacourtiaceae*, *Guttiferae*, *Datisceae*, *Annonaceae*, *Ebenaceae*, *Myristicaceae*, *Apocynaceae*, *Moraceae*, *Ebenaceae*, *Sapotaceae*, and some from *Dipterocarpaceae*. There are 204 botanical species; 17 of them are endemic species and protected by the Government Regulation No.7 Year 1999. The area is also the best place for endemic

species, especially Sulawesi deer-pig as it has hot-puddle that contains sulphur-salt (Hamidun, 2012).

Research Methodology

Research Location

The research is carried out in Nantu Boliyohuto Wildlife Reserve, which is administratively located in Gorontalo District, Boalemo District, and Northern Gorontalo District.

Data and Collection Data Technique

The types of the collected data are primary and secondary data. They cover the potentials of flora and fauna, landscape, social-culture of the society, and the management planning of the area. The primary data is obtained from the observation results in the field and the interviews with the community figures, the experts, and the related stakeholders. The secondary data is obtained from the results of the previous studies, the reports of the non-government institutions, and the Internet-browsing.

Result and Discussion

Bio-physical and cultural potentials of Nantu-Boliyohuto Wildlife Reserve make the area strategic to be developed as an ecotourism area. Below are ecotourism attractions that can be developed:

Wildlife Attraction

The area has unique potentials of fauna that can be developed as one of the tourism destination areas in the Eastern Indonesia. The data analysis results indicate that there are five types of protected endemic species, e.g. *Babyrousa babyrussa*, anoa (*Bubalus depressicornis*), tarsius (*Tarsiusspectrum*), cuscus (*Strigocuscus celebensis*), and Sulawesi Heck's Macaque / Sulawesi black monkey (*Macaca heckii*). Mammal type of *Babyrousa babyrussa* dominates the area. It is a wild animal that has a short-round body; the most uniqueness of the animal is that it has two canine teeth that emerge vertically penetrating through the skin and curving backward over the front of the face and toward the forehead. According to Mardiastuti and Soehartono (2003), Sulawesi deer-pig is under protection based on the Government Regulation No. 7 Year 1999 and has been listed in the CITIES for the category of Appendix 1, which is the type of animal that is very few in number that can extinct.

There are hot-puddles in the area as hot and salty water-resources (*salt-lick*) surrounded by many types of primary forest-plants. The soil analysis results of the salty water-resources indicate that they contain minerals, e.g. sulphure-sulphate (SO₄S), Ferric (Fe), Natrium (Na), manganic (Mn), and calcium (Ca). The mineral contents (especially sulfur and sulphate) are totally different with the contents of the two substances outside the puddles. These minerals are important for the fauna because they can help the metabolism process within the bodies of the animals (Clayton, 1996). This place is one of the habitats for certain types of endemic and unique fauna, e.g. Gorontalo *babyrussa*, anoa, heck's macaque / black monkey and for some types of birds to bath, playing, eat, and drink. The attraction can be observed at around 4.00 pm. or 4.30-6.00 pm. Access to the area is not difficult as it takes only ten minutes to walk from Adudu Post Station in the area of Nantu—Boliyohuto Wildlife Reserve. The showed attraction is the natural scenery of the rare endemic fauna, e.g. their behaviours when eating, drinking, inseminating, and playing. The attraction is very interesting and rarely found in any other places around the world. The existence of the salt-lick (salty water resources) and the rare-protected-endemic fauna are the main attractions of the natural tourism of Nantu Boliyohuto Wildlife Reserve.

Birds Watching

The results of Dunggio study (2005) show that 49 bird species are found in Nantu Boliyohuto Wildlife Reserve, 24 of which are endemic birds of Sulawesi (Table 1). Of the 24 species, 12 are protected by law as outlined in the Government Regulations No. 7 Year 1999. Extincted types of birds are Pygmy Hanging Parrot (*Loriculus exilis*), Sulawesi Dwarf Kingfisher (*Ceyx fallax*), and Pied Cuckooshrike (*Coracina bicolor*). One of the prominent species of birds that are easily found in each level of the habitat is Knobbed Hornbill (*Rhyticeros cassidix*). It is counted as the type that has various sounds that can be heard from 300 meters. Nantu Boliyohuto Wildlife Reserve is very rich with food resources of fruits that are available throughout the year and that become the main food resources for the birds of the area.

The Uniqueness of Botanical Attraction

Nantu Boliyohuto Wildlife Reserve has unique bo-

Table 1. Types of Birds in Nantu Boliyohuto Wildlife Reserve Area

| Types of Birds | Types of Birds |
|---|--|
| Sulawesi Bay Coucal (<i>Centropus celebensis</i>) | Western Cattle Egret (<i>Bubulcus ibis</i>) |
| Slender-Billed Crow (<i>Corvus enca</i>) | Snoring Rail (<i>Aramidopsis platen</i>) |
| Barn Swallow (<i>Hirundo rustica</i>) | Barred Rail (<i>Gallirallus torquatus</i>) |
| Ashy Woodpecker (<i>Mulleripicus fulvus</i>) | White-Face Cuckoo-Dove (<i>Turocoena manadensis</i>) |
| Spotted Dove (<i>Streptopelia chinensis</i>) | Metallic Pigeon (<i>Columba vitiensis</i>) |
| Knobbed Hornbill (<i>Rhyticeros cassidix</i>) | Monyet Hitam Sulawesi (<i>Macaca heckii</i>) |
| Superb Fruit Dove (<i>Ptilinopus superbus</i>) | Ornate Lorikeet (<i>Trichoglossus ornatus</i>) |
| Sulawesi Leaf Warbler (<i>Phylloscopus sarasinorum</i>) | Green Imperial Pigeon (<i>Ducula aenea</i>) |
| Pied Bush Chat (<i>Saxicola caprata</i>) | Woolly-Necked Stork (<i>Ciconia episcopus</i>) |
| Red Turtle Dove (<i>Streptopelia tranquebarica</i>) | Wandering Whistling Duck (<i>Dendrocygna arcuata</i>) |
| Sulawesi Grouse Dove (<i>Gallicolumba tristigmata</i>) | Omboyna Cuckoo-Dove (<i>Macropygia amboinensis</i>) |
| Stephan's Emerald Dove (<i>Chalcophaps stephani</i>) | Pied Heron (<i>Egretta picata</i>) |
| Sulawesi Hornbill (<i>Penelopides exarhatus</i>) | Cerulean Cuckooshrike (<i>Coracina temminckii</i>) |
| Pied Cuckooshrike (<i>Coracina bicolor</i>) | Barred Honey Buzzard (<i>Pernis celebensis</i>) |
| Sulawesi Cicadabird (<i>Coracina morio</i>) | Black-Billed Koel (<i>Eudynamis melanorhinca</i>) |
| Ruaty Bellied Fantail (<i>Rhipidura teysmanni</i>) | Hair-Crested Drongo (<i>Dicrurus hottentotus</i>) |
| Sulawesi Thrush (<i>Catanopera turtuides</i>) | Black-Naped Oriole (<i>Oriolus chinensis</i>) |
| Ivory-Backed Woodswallow (<i>Artamus monachus</i>) | Brahminy Kite (<i>Haliastur Indus</i>) |
| Pygmy Hanging Parrot (<i>Loriculus exilis</i>) | Blue-Backed Parrot (<i>Tanygnathus sumatranus</i>) |
| Sulawesi Dwarf Kingfisher (<i>Ceyx fallax</i>) | Silver-Tipped Imperial Pigeon (<i>Ducula luctuosa</i>) |
| Grey-Sided Flowerpecker (<i>Dicaeum celebicum</i>) | Black-Naped Fruit Dove (<i>Ptilinopus melanospila</i>) |
| White-Necked Myna (<i>Streptocitta albigollis</i>) | Oriental Darter (<i>Anhinga melanogaster</i>) |
| Common Kingfisher (<i>Alcedo atthis</i>) | Eastern Yellow Wagtail (<i>Motacilla flava</i>) |
| Barred Rai (<i>Gallirallus torquatus</i>) | Pacific Swallow (<i>Hirundo tahitica</i>) |
| Sulawesi Myna (<i>Basilornis celebensis</i>) | Black Sunbird (<i>Nectarinia Aspasia</i>) |
| Piping Crow (<i>Corvus typicus</i>) | White-Rumped Triller (<i>Lalage leucopygialis</i>) |
| Uniform Swiftlet (<i>Aerodramus vanikorensis</i>) | Purple Needletail (<i>Hirundapus celebensis</i>) |
| Sulawesi Babbler (<i>Trichastoma celebensis</i>) | Pied Imperial Pigeon (<i>Ducula bicolor</i>) |

Source: Dunggio (2005)

tanical species, e.g. endemic species protected by the Government Regulation No. 77 Year 1999 on conservation of flora and fauna species and the CITIES for Appendix II on species that are not currently categorized as endangered but have the possibility to become so if not well-managed (Table 2). Species of *Livistonia Rotundifolia*, in particular, have become endangered as the leaves are used by the local community as the materials for house roof. *Cycas Rumphii* is a species grown around the lowland of the forest area, which is usually found along the river bank; its stem can reach 6 meters. The unique plant is the example of the transition from a bracken-plant to be a bloomy plant. Its population is endangered as it is usually used as a decorated plant of orchid. It is not only used to treat stomachache and blood vomiting, but also to become an edible plant as its pith contains sago.

Species of endemic Sulawesi plants that are found include *Macaranga crassistipulosa*, *Elmerillia*

ovalis, *Terminalia celebica*, *Diospyros hebecarpa*, *Pterospermum celebicum*, *Manilkara celebica*, *Cratoxylum celebicum*, *Dillenia serrata* and *Dillenia sp.* One of the interesting species of plants is Rao Tree or *Dracontomelon dao* and *Palaquium obovatum* that is well-known as Nantu Tree. The diameter of the trees can reach 150 cm. The other plant found in this area is Giant Orchid (*Grammatophyllum speciosum*). The orchid is unique as it has great growth size that can reach 5 meters. The flower of the plant has a freckles pattern like a tutul-panther that makes it more beautiful and strong as a flora attraction.

Forest-Tracking

Forest tracking is one of the natural tour attractions that can be carried out in Nantu-Boliyohuto Wildlife Reserve. A variety of tour objects can be observed along the line of the forest tracking, e.g. diversity and uniqueness of plant species, endemic fauna contact of Sulawesi heck's macaque, Sulawesi hornbill

and some other fauna species as well as the beautiful and unique landscape of Nantu Boliyohutu Wildlife Reserve.

There are Adudu Waterfall and Pangahu waterfalls found in the area. Adudu Waterfall is located in the northern side of Adudu Post Station with the altitude around ± 10 meters. The tracking can take 20 minutes walk on foot along the shallow, purified, and cool side of Adudu River. Along the tour to the waterfall location, a special scenery of the lowland-rain forest can be found, e.g. trees of high diameter that have high dense on the tops. Pangahu Waterfall can be reached on foot by walking past the local village as well as plantation and farming areas. The tour to the waterfall takes 30 minutes from Pangahu Village. The waterfall is unique as it has three outpouring/falling waters with the ranging distance of about 2 meters. The altitude of the waterfalls range from five to ten meters. The location of the third waterfall is in the area of HTP Boliyohutu. The tour to the location can take a two-hour walk from the entry of Sidoharjo Village.

River Attraction

A beautiful long view of the river can be enjoyed along the tour (through the river lane) into Nantu Boliyohutu Wildlife Reserve. There are various objects that can be enjoyed along the river-lane, e.g. the

scenery of the mountains, hills, spread out areas of the trees, forests, and local plantations (corns and coconuts are planted along the area of the river-lane), as well as the natural panorama. These sceneries become more beautiful with the existence of the birds flying all over the area, the riparian, and the other wildlife animals such as lizards and monkeys.

Educational and Cultural Attraction

Nantu Boliyohutu Wildlife Reserve provides knowledge resources to be found and understood by the tourists. The variety of the biodiversity and its the ecosystem provide endless knowledge to be learnt, e.g. habitats and behaviors of the fauna as well as botanical diversity. The tourists can also obtain information of how women of the local community make the "kerawang" fabric-handycraft, the local cooking oil from coconut milk, the brown sugar, the Gorontalo local cakes, the experience of following men hijack the farm, the philosophy of certain seedling time, the traditional market interaction as well as the local traditions and their meanings, e.g. circumcision for the boys, lemon showery for the girls, marriage, funeral ceremony, and other occasionally carried out traditions. The traditions are "Walima" to memorialize Maulid Nabi Muhammad SAW (Muhammad's Birthday), "tumbilotohe" that is the

Table 2. Endemic and Protected Species of Plants

| Local Name | Scientific Name | Status | | |
|-------------|-------------------------------------|--------|-----|----|
| | | CITES | StP | E |
| Boyuhu | <i>Pterospermum celebicum</i> | - | - | + |
| Walongo | <i>Elmerillia ovalis</i> | - | - | + |
| Duito | <i>Cratoxylum celebicum</i> | - | - | + |
| Kayu Jambu | <i>Kjellbergiodendron celebicum</i> | - | - | + |
| Dengilo | <i>Dillenia serrate</i> | - | - | + |
| Makakata | <i>Terminalia celebica</i> | - | - | + |
| Maranti | <i>Shorea sp</i> | - | + | - |
| Oloitoma | <i>Diospyros hebecarpa</i> | - | - | + |
| Palem kipas | <i>Licualla flabellum</i> | + | + | |
| Woka | <i>Livistonia rotundifolia</i> | II | + | + |
| Sarai | <i>Caryota mitis</i> | II | + | + |
| Patuhu | <i>Cycas rumphii</i> | II | + | + |
| Buluhungo | <i>Macaranga crassistipulosa</i> | - | - | + |
| Timbuolo | <i>Manilkara celebica</i> | - | - | + |
| Heade | <i>Diospyros celebica</i> | - | - | + |
| Sempur | <i>Dillenia sp</i> | - | - | + |
| | Total | 3 | 5 | 15 |

Information: CITES = International Convention on Wildlife Protection, StP= protecting status (the mark "+" based on Government Regulation No. 7 Year 1999), E : Endemic Sulawesi (The mark "+")

three-day setting of lights on the 27th of Ramadhan to welcome Idul Fitri Day. These are knowledge resources that cannot be learnt from formal education.

Conclusion

Nantu-Boliyohuto Wildlife Reserve has been identified as one of conservational area in Gorontalo Province that provides Ecotourism Attraction. This conservational area with 204 types of plants, 20 types of wild animals, and 56 types of birds has also potential economic and social contribution to the community, and the potential attractions of the Nantu Boliyohuto Wildlife Reserve biodiversity as the object and attraction are: birds observation, wild life attraction, botanical beauty and unique attraction, forest tour, river tour, natural panorama tour, photo hunting, and educational tour.

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