

# Potential Identification of The Local Environment as a Science Learning Resource for the Junior High School Students in Southeast Sulawesi

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**Abstract**—This study aimed to identify the potency of the local environment that can be utilized as a learning resource. The research was conducted in National Park of Rawa Aopa Watumohai in South Konawe District, Wakatobi National Park in Wakatobi Regency, and Forest Area in Kolaka District. The method of this study was a survey method begun with the Curriculum Analysis of 2013 that is relevant to Basic Competence (BC) for natural science students in grade VII, furthermore identified the potential of the local environment as research objects. The results showed that: 1) BC has been analyzed related to the potential of the local environment that can be used as a source of science learning, namely BC.3.2. identified the living and non-living characteristics of the various objects and living things exist in the environment; BC. 3.3. understand the procedure of classification of living creatures and nonliving objects as part of scientific work, and to calcify various living things and non-living objects based on observed traits; BC. 3.8. describe the interaction between living creatures and their environment. 2) has identified there were various of learning sources from environmental potency such as Rawa Aopa Watumohai National Park in the form of mangrove, swamp, savanna, and forest ecosystem and has a high diversity of flora and fauna. In Marine Park Wakatobi, it was found that marine biodiversity in the form of coral reefs, has a variety of fish species, and were various types of sea birds. In the area of Mekongga forest, there were various types of plants.

**Keywords**—*identification, local environmental potential, learning resources*

## I. INTRODUCTION

Natural science is as an applicative oriented education, development of thinking skills, learning skills, in the sense of curiosity, caring, and responsibility on the social and natural environment. Natural science is referred to like the introduction of the natural environment and various superiorities in archipelago [1]. This indicates that natural science demands teachers to utilize the potency of the local environment as a learning resource. The use of the local environment as a learning resource helps teachers to increase the effectiveness of learning, and particularly help in presenting processes, natural signs or events.

Southeast Sulawesi is a province with a wide variety of natural resources both in land and at sea to be potentially developed as a learning resource, such as Rawa Aopa Watumohai National Park. The park has a variety of

ecosystems, rich in living organisms both plants and animals, conservation forest of Mt. Mekongga also has biodiversity and to be used as conservation forest. Moreover, Wakatobi National Park possesses a verity of coral reefs and commercial ornamental fish, several species of sea turtle and seabirds, Tiworo Strait is a coastal area consisting of small islands with a high potency of fish resources, and contains an interesting aquatic ecosystem with high diversity, including the protected fish species. In addition, the coastal area of Buton Island has a coral reef ecosystem located in Wabula and Pasarwajo Regency. The ecosystem can be seen from two aspects namely coral biodiversity including the number of species/types of coral and percent coverage of live coral, and many other local resources to be used for learning objects.

The abundance of environmental potency in Southeast Sulawesi has not been optimally utilized by biology teachers at schools. Therefore, it is important to identify the potency of local resources that can be used for science specifically to junior high schools in Southeast Sulawesi. The identification is adjusted to Basic Competence in the subject, and that will be used as a manual for those in teaching science at schools.

## II. METHODS

The research was focused on three sample collection sites. The sites were Rawa Aopa Watumohai National Park (RAWNP), Conservation Forest of Mt. Mekongga and Wakatobi National Park. Data were collected using a quantitative approach with exploration method. The research was carried out by the following stages: 1) information collection, 2) planning, 3) exploration, and 4) identification.

Information collection was conducted by preliminary research to understand the real description of K.13 implementation that can accommodate the potency of local resources to be included natural science for grade VII of junior high school. Study literature was conducted to explore the theories associating with media and learning materials as well as relevant studies.

Planning stages were started by planning the potency of local resources that can be used for learning, including (a) the mapping of Basic Competence (BC) based on the potency of the local environment (b) formulate the learning objectives; (c) formulate material frame.

Exploration stage was done by determining sampling sites through the exploration of research locations and at the same time identified local resources potential to be used for object materials based on the mapping of BC.

The collected data were then analyzed descriptively and presented in the form of figures and description.

### III. RESULTS AND DISCUSSION

#### A. Rawa Aopa Watumohai National Park

Rawa Aopa Watumohai National Park is an important conservation area in Southeast Sulawesi with a total area of 105 194 ha. The park is located in four regencies: East Kolaka, Konawe, South Konawe, and Bombana [2], and possesses four ecosystems, i.e., swamp, mangrove, low land forest, and savanna. Those four ecosystems have their own distinction and uniqueness.



Fig. 1. The types of ecosystem found in Rawa Aopa Watumohai National Park: a) low land forest; b) savanna; c) mangrove; d) swamp

Based on the research and study literature, there are several fish species identified in Rawa Aopa National Park, including snakehead fish (*Chana striata*), catfish (*Clarias batrachus*), perch (*Tricogaster* spp.), goldfish (*Helostoma temenckii*), tilapia (*Anabas testudineus*), and eel (*Monopterus albus*). In addition, there are also waterfowl birds found such as stork (*Egretta intermedia*), milky stork (*Mycteria cinerea*), climbing perch (*Anhinga melanogaster*), Purple heron (*Ardea purpurea*), Nankeen night heron (*Nycticorax caledonicus*), and whistling duck (*Dendrocygna arquata*). Meanwhile, the reptilian groups found were crocodiles (*Crocodylus prosus*), monitor lizards, (*Varanus salvator*), sail-finned lizard (*Hydrosaurus amboinensis*), phyton, (*Phyton reticulatus*), green snake, and black snake. There were also some mammals including cows (*Bos taurus*), buffaloes (*Bubalus bubalis*), deer (*Cervus timorensis*), boar (*Sus celebensis*), and midget buffalo (*Bubalus depressicornis*).

There are several plants found in swamp ecosystems, such as lotus flower, pandanus swamp, and weeds. Some mangrove vegetation found were Rhizophora, Bruguiera, Soneratia, *Nypa xylocarpus* sp., *Aegiceras* sp. Rawa Aopa National Park has diverse palm trees, and it is found at least 30 types of palm trees classified into 15 genera, and of those palms, 11 types are endemic to Sulawesi [3].

Rawa Aopa National Park composed a high percentage of savanna, which is the association of grass (*Imperata cylindrica*) with cabbage palm (*Corvpha utan*), doub palm (*Borassus flabelifer*), thorny bamboo (*Bambusa spinosa*), tipulu (*Arthocarpus teysmanil*) and shrubs. The composition becomes an ideal place for several animals such as Maleo bird (*Macrocephalon maleo*), green junglefowl (*Gallus varius*), red junglefowl (*Gallus gallus*), knobbed hornbill

(*Rhyticeros cassidix*), white imperial-pigeon (*Ducula luctosa*), yellow-crested cockatoo (*Acatua sulphurea*), and other types of water and migrant bird species. 12 families of swaterbird species and the most abundant families are also found in Rallidae and Ardeidae [4]. It was recorded that 76 species of a bird consisting of 30 families found in the park. Of that species, 16 types are endemic to Sulawesi, 57 types are unprotected, and 19 types were protected. Around 29 types of water birds (38%), while the rest are land birds (62%) [5].

There are 54 bird species found in the mangrove area of the park. Of that, eight species are endemic to Sulawesi, and three species are migrant species. Those eight endemic species are *Dicaeum nehrkorni*, *Phylloscopus sarasinorum*, *Spizaetus lanceolatus*, *Spilornis rufipectus*, *Zosterops consobrinum*, *Coracias temminckii*, *Loriculus stigmatus*, and *Coracias temminckii* [6].

In the low land ecosystem, plenty of rattans, lianas, shrubs, and herbs were found. The dominant vegetation found was varied, consisting of the gaub tree (*Dyospiros malabarica*), *Vitex cofassus*, Bark laban (*Vitex pubescens*), *Perinarium corimbosum*, *Tetrameles nudiflora*, *Anthocephalus cadamba*, *Metrosideros petiolata*, spinach (*Intsia* sp), *Callapia celebica*, and many other species. The wild species found in the ecosystem were midget buffalo (*Bubalus* sp.), Moluccan babirusa (*Babyrousa babyrussa*), booted macaque (*Macaca ochreata*), spectral tarsier (*Tarsius spectrum*), Sulawesi Palm civet (*Macrogalidia musschenbroek*), the Celebes warty pig (*Sus celebensis*), knobbed hornbill (*Rhyticeros cassidix*) and cockatoo.

#### B. Protected Forest in Mekongga Mountain

Mekongga Mountain, located in Kolaka, Southeast Sulawesi, has distinction forest. From a biological perspective, the forest has a principle function, which is to support the sustainability of various lives in it.

Conservation forest in Mt. Mekongga scientifically meets the criteria for conservation forest based on the covered area, biology, ecology, hydrology, and socio-economy aspects.

The results of survey research reported that there are morphometric variations and color distinction several species of bees [7]. A number of species of Cerambycid beetles found on Mount Mekongga varies with the number of species that vary at each altitude. In the Mekongga mountain forest, 347 individuals were found with 76 species of Cerambycid beetles [8].

In addition to that, 27 species of understory plants existing in conservation forest of Mekongga Mountain, and 13 plant species with a total of 217 individuals are found in Solodong Forest. Meanwhile, 21 of plants with a total of 342 individuals found in the Leang Paniki Forest, located in Tamburase Village, Wawo Regency, Southeast Sulawesi [9].

Basic data on biological aspects, diversity, and composition of living organism particularly endemic, critical, and commercial species around the forest area are required as a learning resource.

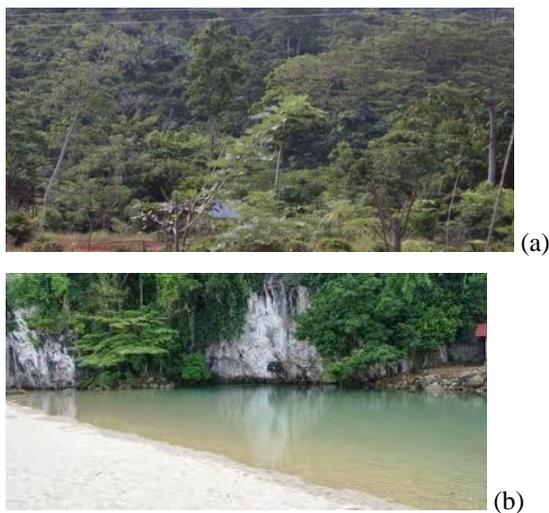


Fig. 2. (a) Forest in Mekongga Mountain and (b) Tamburasi River in Kolaka

### C. Wakatobi National Marine Park

Wakatobi National Marine Park, located in Wakatobi Regency, Southeast Sulawesi, is one out of 50 national parks in Indonesia. The marine park was stated as a national park by the national government in 2002, with a total area of 1.39 million ha. The park relates to marine life, scale, and condition of coral reefs. It is also placed as the highest priority from marine conservation in Indonesia. The water depth of the park is varied, but the deepest reaches 1.044 m.

In Wakatobi National park, it can be found the beauty of underwater panorama with 25 groups of coral reefs. There are 112 species of coral reefs out of 13 families located in 25 spots along 600 km of coastal line. The species are *Acropora formosa*, *Hyacinthus*, *Psammocora profundasfla*, *Pavona cactus*, *Leptoseris yabei*, *Fungia molucensis*, *Lobophyllia robusta*, *Merulina ampliata*, *Platygyra versifora*, *Euphyllia glabrescens*, *Tubastraea frondes*, *Stylophora pistillata*, *Sarcophyton throckelliophorum*, and *Sinularia spp.*

Apart from coral reefs, the park also has a wide variety of fish species. Fish diversity found in the park is 93 commercial and ornamental fish, such as Argus grouper (*Cephalopholis argus*), Bluespine Unicorn fish (*Naso unicornis*), Titan triggerfish (*Balistoides viridescens*), Napoleon (*Cheilinus undulatus*), two-spot banded snapper (*Lutjanus biguttatus*), rabbitfish (*Siganus guttatus*), *Amphiprion melanopus*, *Chaetodon speculum*, *Chelmon rostratus*, *Heniochus acuminatus*, *Lutjanus monostigma*, *Caesio caerulea*.

Seabird species are also found in Wakatobi National Park, for example, brown booby (*Sula leucogaster plotus*), Malay plover (*Charadrius peronii*), Eurasian kingfisher (*Alcedo atthis*). Moreover, three species of sea turtles are also seen foraging in the park, such as hawksbill sea turtle (*Eretmochelys imbricata*), loggerhead sea turtle (*Caretta caretta*), and olive ridley sea turtle (*Lepidochelys olivacea*).

Wakatobi is considered unique due to its biodiversity, and the coral reefs condition in the park is making Wakatobi as the highest priority of world marine conservation in Indonesia. At least, there are four species of sea turtle identified in the park, including green and hawksbill sea

turtle. Furthermore, there are around 396 species of scleractinian, 31 species of fungi, 31 species of foraminifera, 34 species of Stomatopoda, and 942 species of fish. Such invaluable biodiversity has formally made Wakatobi become Marine National Mark since 1996 [10].

There are 20 species of mangrove belonging to 11 families, and they are dominated by Rhizophoraceae. The mangrove species found in the park are *Rhizophora mucronata* Lamk; *Rhizophora apiculata* Bl; *Bruguiera gymnorhiza* (L.) Lamk; *Ceriops Tagal* (Perr.) C.B. Rob; *Ceriops decandra* (Griff.) Ding Hou; *Sonneratia alba* Smith; *Sonneratia caseolaris* (L.) Engl; *Avicennia marina* (Forsk.) Vierh; *Xylocarpus granatum* Koenig; *Xylocarpus molucensis* (Lamk.) Rocm; *Lumnitzera littorea* (Jack) Voigt; *Lumnitzera racemosa* Wild; *Aeguceras corniculatum* (L.) Blanco; *Osbornia octodonta* F.v.M; *Pemphis acidula* Frost. & *Acanthus ebracteatus* Vahl; *Nypa fruticans* Wurmb; *Excoecaria agallocha* L; *Acrostichum speciosum* Wild; and *Acrostichum aureum* Linn. The mangrove flora in Wakatobi is distributed in Kaledupa, Lentea, Derawa, Hoga, Wangi-Wangi, Tomia, and Binongko Island [11].

Furthermore, there are 18 species of Echinodermata in Wangi-Wangi and Kapota waters, Wakatobi, Southeast Sulawesi. The Echinodermata consists of four types: Echinoidea (sea urchin) represented by six types, Asteroidea (sea star) represented by 6 types and Ophiuroidea represented by two types [12].



Fig. 3. Wakatobi National Park.

Based on potential identifications of local resources and study litterateurs, Basic Competence (BC) is then mapped containing materials associated with the potency of local resources to be used for learning natural science in junior high school (Table 1).

TABLE I. THE MAPPING OF BASIC COMPETENCE BASED ON THE POTENCY OF LOCAL RESOURCES.

Basic Competence	The potency of Local Resources in Southeast Sulawesi
Identify living and non-living characteristics from objects and organisms in the surrounding environment	<ol style="list-style-type: none"> <li>Rawa Aopa Watumohai National Park (RAWNP)               <ol style="list-style-type: none"> <li>The ecosystem of the land forest, mangrove, savanna, and swamp.</li> <li>Existing plant species, two of the species are protected namely resin (<i>Agathis homii</i>) and kasumeeto (<i>Dysoxylum malabarica</i>).</li> <li>Possess various endemic species of palms</li> </ol> </li> <li>Protected forest of Mekongga Mountain, plant community, pine forest.</li> <li>Wakatobi national park contains.               <ol style="list-style-type: none"> <li>Diverse fish species: blue-spotted grouper (<i>Cephalopholis argus</i>), blue spine unicorn fish (<i>Naso unicornis</i>), Tital triggerfish (<i>Balistoides viridescens</i>), <a href="#">Napoleon</a> (<i>Cheilinus undulatus</i>), two-spotted banded snapper (<i>Lutjanus biguttatus</i>), rabbit fish (<i>Siganus guttatus</i>).</li> <li>Seabirds: brown booby (<i>Sula leucogaster plotus</i>), Malays plover (<i>Charadrius peronii</i>), Eurasian kingfisher (<i>Alcedo atthis</i>).</li> <li>Three species of sea turtle: hawksbill turtle (<i>Eretmochelys imbricata</i>), <a href="#">loggerhead sea turtle</a> (<i>Caretta caretta</i>), and olive ridley sea turtle (<i>Lepidochelys olivacea</i>).</li> </ol> </li> </ol>
Understand the procedure of classification of living organism and nonliving objects as a part of scientific work, and classify living organisms and non-living objects based on observed characteristics	All environmental potency existing in: <ol style="list-style-type: none"> <li>RAWNP: represents plants and animals species.</li> <li>Conserved Forest in MT. Mekongga: represents plant species.</li> <li>Wakatobi National Park represents species of marine life.</li> </ol>
Describe the interaction between a living organism and its environment	<ol style="list-style-type: none"> <li>RAWNP is a habitat to various species of birds, including: Mleo (<i>Macrocephalon maleo</i>), Milky stork (<i>Mycteria cineria</i>), Knobbed hornbill (<i>Rhyticeros cassidic</i>) etc. types of primates: Spectral tarsier (<i>Tarsius spectrum</i>) and booted macaque (<i>Macaca ochreata</i>), critically endangered and protected big mammals: midget buffalo, cuscus, deers, Babirusas, and Sulawesi rousette; types of reptiles, such as rice paddy snakes, and crocodiles.</li> <li>Conserved Forest of Mt. Mekongga has a variety of insects interacting with their environment.</li> <li>Wakatobi National Park: the interaction between coral reefs and variety of fish species: blue-spotted grouper (<i>Cephalopholis argus</i>), blue spine unicornfish (<i>Naso unicornis</i>), Titan triggerfish (<i>Balistoides viridescens</i>), Napoleon (<i>Cheilinus undulatus</i>), two-spotted banded snapper (<i>Lutjanus biguttatus</i>).</li> </ol>

#### IV. CONCLUSION

Based on the results of mapping analysis of Basic Competence and the potency of local resources, it was identified learning materials in natural science for grade VII of junior high school that can make use local potency as a learning resource such as those found in RAWNP in South Konawe, Conserved Forest of Mt. Mekongga in Kolaka Regency, and Wakatobi National Park with basic competence of 3.2, 3.3, and 3.8.

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