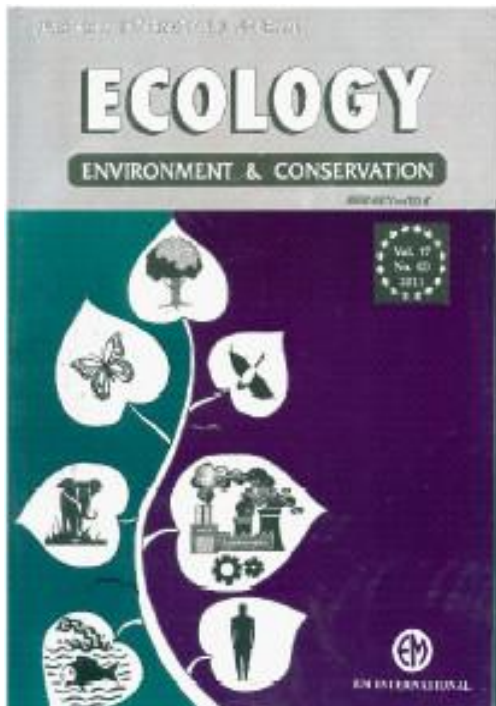


# Ecology, Environment and Conservation

UGC, NEW DELHI,INDIA APPROVED JOURNAL



[Download Sample Paper](#)

ISSN: 0971-765X

**Chief Editor**

Prof.(Dr.) R.K.Trivedy, Pune, India

[Editorial Board](#)

[Download Sample Issue](#)

[Subscription Rates](#)

[Submit Article](#)



[Click here for scimagojr.com](http://scimagojr.com)

SCOPUS - H Index - 11

NAAS Rating - 4.89

## Brief About Ecology, Environment and Conservation

Published Quarterly Since 1995. Ecology, Environment and Conservation is published in March, June, September and December every year.

ECOLOGY, ENVIRONMENT AND CONSERVATION is one of the leading International environmental journal. It is widely subscribed in India and abroad by Institutions and

Individuals in education and research as well as by Industries, Govt. Departments and Research Institutes.

**Ecology, Environment and Conservation is in Master Journal List of ISI (Thomson Reuters, U.S.A.).**

**Ecology, Environment and Conservation is abstracted/covered in:**

- Chemical Abstracts, U.S.A.
- SCOPUS
- EBSCO Publishing, U.S.A.
- Cambridge Science Abstracts
- Ecology Abstracts
- Pollution Abstracts
- Eco-Disc CD Rom
- Geological Abstracts
- International Development Abstracts
- Oceanographic Literature Review
- Zoological Records
- Indian Science Abstracts, Nisair, India
- Elsevier's Compendex
- Elsevier's Current Awareness in Biological Sciences
- Elsevier's Encompass
- Elsevier's Geobase

**Ecology, Environment and Conservation** journal is accredited with National Academy of Agricultural sciences, NAAS, India.

**Ecology, Environment and Conservation** journal is covered by SCOPUS.

**Ecology, Environment and Conservation** journal also features in Uhlrich International Periodical Directory, U.K., Gale Directory, U.K. and SAARC directory of periodicals.

**Ecology, Environment and Conservation** is UGC , New Delhi approved journal (No. 12454)

# **Ecology, Environment and Conservation Editorial Advisory Board**

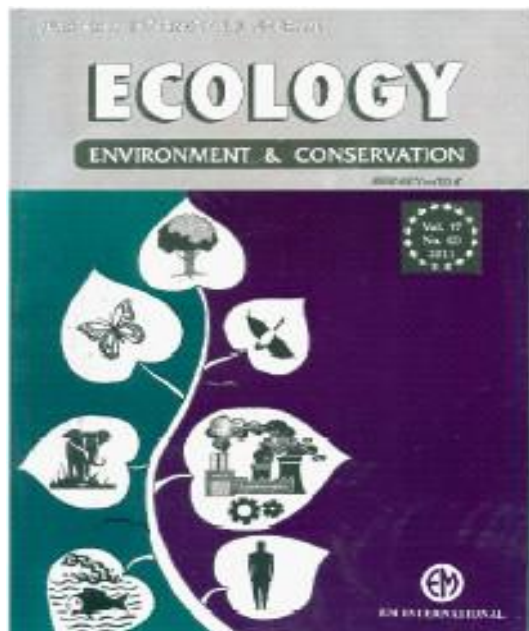
**Chief Editor**

**Prof.(Dr.) R.K.Trivedy, Pune, India**

## **EDITORIAL ADVISORY BOARD**

- |                                  |  |
|----------------------------------|--|
| 1. Dr. Teresa Ferreira, Portugal | 19. Dr. A. Olawale, Nigeria                |
| 2. Dr. Michael Ukwuru, Nigeria   | 20. Dr. Ing. Agr. Mario Ridardo Sabbatini, |

3. Dr. Moses Inbaraj, Chennai
4. Dr. D.J. Lee, Taiwan
5. Dr. Christial Paul P.delacruz, Phillipnes
6. Dr. T. Bahorun, Mauritius
7. Dr. Linda Blackwell, Australia
8. Dr. G. Zellner, Netherlands
9. Dr. Wilson S. Tisera, Kupang, Indonesia
10. Dr. M.F. Hamoda, Kuwait
11. Dr. H.A.Abrahamse, South Africa
12. Dr. Arulmozhiyal R., Salem
13. Dr. Hassan Ibrahim Ali, Sudan
14. Dr. A.R.Ghosh, Burdwan, India
15. Prof. M. Zaman, Bangladesh
16. Dr. Marcantonio Bragdin, Venice, Italy
17. Dr. Z. Fuat Topark, Turkey
18. Dr. Z. Li. Bonn, Germany
- Argentina
21. Dr. Philip C. Reid, U.K.
22. Dr. Bajcinovci, B. Kosovar, Bosnia
23. Dr. Mohd. Yusuf, Malaysia
24. Dr. Oswaldo A. Feernandez, Argentina
25. Dr. Ms. Mirela Tulik, Warsaw, Poland
26. Dr. L.L. Chukwu, Nigeria
27. Dr. Azni Idris, UPM, Malaysia
28. Dr. G. Suresha, Saudi Arabia
29. Dr. Amresh Chandra Pandey, Jharkhand, India
30. Dr. Shambhu Sharan Kumar, Ranchi, India
31. Dr. A.K. Panigrahi, Berhampur, India
32. Dr. Ahmed EI Mahmoudi, Saudi Arabia
33. Dr. Seyed Mohammad Tajbakhsh, Iran
34. Dr. Amin L. Setyo, Indonesia
35. Dr. Francis Gbogbo, Ghana
36. Dr. S. Shabanlou, Iran



# ECOLOGY, ENVIRONMENT AND CONSERVATION

## VOL. 23 (4) : 2017

### CONTENTS

- 1781–1786 The 1313bp luciferase gene sequence in *Diaphanes javanus*  
—*R. Puspitaningrum, A. Izzatii, A. Supiyani and R. Amelia*
- 1787–1797 Analysis of alpha and beta diversity of natural vegetation of the north-eastern pre-caspian coastal region  
—*Ainur A. Nurgaliyeva, Saltanat Zh. Ibadullaeva<sup>1</sup>, Kapar Usen<sup>2</sup>, Elmira Alibayeva<sup>2</sup> and Laila A. Zhusupova*
- 1798–1809 Vitoria bay pollution study in the frame of Tagubar research project - Preliminary biosystemic approach  
—*Guido Perin and Andrea Giacometti*
- 1810–1815 Effect of acute dose of Cypermethrin on hematology and micronuclei of Nile Tilapia (*Oreochromis niloticus* L.)  
—*Amin Setyo Leksono, Shinta Hiflina Yuniari and Asus Maizar Suryanto Hertika*
- 1816–1825 The evaluation of nest relocation method as a conservation strategy for saving sea turtle populations in the North Coast of Manokwari – Papua Barat Province – Indonesia  
—*Ricardo F. Tapilatu*
- # 1826–1836 A study of strategic plan for conservation and society in the Seho small Island  
—*Gun Mardiatmoko, Agustinus Kastanya, Debby Vemiancy Pattimahu and Murianto Wenno*
- 1837–1849 The Effect of Incentive Participation Program and Social Capital on Public Participation, and Public Welfare as a mediators of Forest Management in the Baluran National Park  
—*Adil Siswanto, Moeljadi, Djumilah Hadiwijoyo and Rofiaty*
- 1850–1559 Study of airborne bacterial density affecting respiratory system health in buses indoor air of Kermanshah city, Iran  
—*Mohammad Soltanian, Narges Ozeiri, Zahra Tavakoli, Farid Najafi, Parviz Mohajeri and Touraj Esmailzadeh*
- 1860–1863 The environmental impact of Angouran mining on the regional aquifers, Iran  
—*Hossein Pirkharrati, Behnam Pardakhti and Amir Mahdavian*
- 1864–1867 Biological spectra of Kallamali hills of Southern Eastern Ghats, Tamil Nadu, India  
—*R. Prabakaran and T. Madheswari*
- 1868–1873 Development strategy of Lok baintan floating market tourism area in South Kalimantan province, Indonesia  
—*Ellyn Normaleni*
- 1874–1883 Using hierarchical and Fuzzy methods in site selection of landfill: A case study  
—*Navid Shahrooz*
- 1884–1890 Analysis of malaria incidence based on widespread rainfall factor in Ogan Komering Ulu District, South Sumatera Province, Indonesia  
—*Pademi Alamsyah, Chairil Anwar, Dwi Setyawan and Laila Hanum*
- 1891–1897 Phytomeliorative possibility of fixing fociodrifts and dunes formed as a result to anthropogenic degradation of deserts and sandy soils  
—*B. Rsymbetov, K. Kubenkulov and A. Naushabayev*
- 1898–1902 Economic justification of producing medicinal plants: A case of rural economic diversification  
—*Abbas Tarhanni, Hamid Jafari and Mohamadali Ahmadiyan*
- 1903–1908 Reefbite on Poritiidscoral in reef flat area of South Java’s Sea, Indonesia  
—*Oktiyas Muzaky Luthfi*

- 
- 1909–1916 The performance of vertical flow constructed wetland for grey water treatment as the efforts in preserving water resources  
—*Erina Rahmadyanti and <sup>2</sup>Edi Wiyono*
- 1917–1928 Households' dependence on fuel wood as a preferred source of energy in the tamale metropolitan area of Ghana: An application of the Theory of Planned Behaviour  
—*Jamal Mohammed, Anthony Kofi Osei-Fosu and Hadrat Yusif*
- 1929–1932 Agriculture supply chain for integrated farming zone based on blue and green economy concept at Tuban Regency, East Java, Indonesia  
—*Amenan, Zaenal Fanani, Harsuko Riniwati and Muhamad Firdaus*
- 1933–1941 Effect of drying and wetting on shrinkage and changes in physical properties of peats of Central Kalimantan, Indonesia  
—*Eko Handayanto, Rolland Agustine and Wani Hadi Utomo*
- 1942–1944 A study on design features of gill net operated in Dal Lake, Kashmir, India  
—*Nimat Syed and Ashish Mohite*
- 1945–1951 Prevalence of *Cryptosporidium* and *Giardia* in selected recreational pools in Calamba, Laguna, Philippines  
—*Vachel Gay Paller, Paulo Miguel Kim, Moses Edric Abadilla, Anna Monica Bordado, Michael Galapon, Lief Erikson Gamalo and Constance Aurelle Macalinao*
- 1952–1960 Annual dynamics of the mite communities (Acari: Acariformes and Parasitiformes) in Semi-collared Flycatcher' (*Ficedula semitorquata*) Nests  
—*Rositsa Davidova, Viktor Vasilev and Maria Boycheva*
- 1961–1966 The effect of attitude and local wisdom toward community behavior in rural infrastructure development program in South Sulawesi, Indonesia  
—*Husain Syam*
- 1967–1974 Recreational nature management and Arctic tourism as a new trend towards strategy of sustainable development of the Arctic countries  
—*D.V. Sevastyanov, E.M. Korostelev and L.F. Shitova*
- 1975–1980 The in situ inactivation of the contaminated intensive paddy field of Pb and Cd using biochar and compost  
—*Merismon, Dedik Budianta, Adipatih Napoleon and Hermansyah*
- 1981–1985 Breeding of yield component characters of sunflower (*Helianthus annuus* L.) via line×tester analysis  
—*Seyed Abbasali Andarkhor and Mohsen Bagheri*
- 1986–1990 The investigation of alcoholic beverages and smoking effects on formation of urinary calculus  
—*Saeed Alinejad Moalem, Azam Ghorbania Delavar, Fateme Abedi, Aghil Mollatabar Hasan, Omid Khan Mohammadi Otagh Sara, Mojtaba Rezaee, Seyede Elham Norollahi, Ali Akbar Samadani and Sara Hallajian*
- 1991–1997 Crop growing under the conditions of radioactive contamination of the environment  
—*I.N. Belous, N.M. Belous, V.F. Shapovalov, E.V. Smolsky and D.D. Dobronravov*
- 1998–2004 Influence of seed priming and fertilizers on field performance of black mustard (*Brassica nigra* L.)  
—*Yaghoub Raei, Hajar valipour and Kazem Ghassemi-Golezani*
- 2005–2011 The effect of the origin land and water resources on the fertility of land rice field in Musi Rawas regency, South Sumatra province, Indonesia  
—*J. Bimasri, D. Budianta, Marsi and U. Harun*

- 
- 2012–2017 Transformation of forest ecosystems of the Baikal Region in connection with the climate change and anthropogenic impact  
—*I.V. Gorbunov, B.T. Namzalov, N. Dubrovskiy and L.Z. Budazhapov*
- 2018–2021 Improvement of the electric characteristics of ozonizer for safety provision at the treatment of food products  
—*A.A. Bokanova, N. Esengabylova, T.Y. Meshcheryakova, K.T. Tleumuratova, A.A. Abdurrahmanov and U. Mataiyev*
- 2022–2027 Experimental research of solar energy plant based on tube solar collectors  
—*Murat M. Kunelbayev, Andrey A. Ponomarev, Andrey D. Medvedev, Dmytro V. Mykhalevskiy, Vasily Yu. Meltsov and Alexey S. Kuvayev*
- 2028–2037 A delineation of the alignment of environmental topics coverage in the policy and examination: A content analysis of policy versus examinations  
—*Sikhulile Bonginkosi Msezane*
- 2038–2043 Invasive *Opuntia stricta*: case study in southwestern Saudi Arabia  
—*Yahya S. Masrahi and Osama H. Sayed*
- 2044–2055 Practical realization of ERS data application for quality selection of localities during automated small-scale mapping  
—*Anton Dvornikov, Gleb Zagrebin and Anatoly Afanasyev*
- 2056–2060 Diversity of insects in organic Asiatic pennywort farms in Thailand  
—*Janejira Name and Suvarin Bumroongsook*
- 2061–2067 Performance evaluation of axial flow paddy thresher equipped with modified conveyor belt type mechanical feeding system  
—*Manish Ahuja, Baldev Dogra, M.K. Narang and Ritu Dogra*
- 2068–2071 Comparative oviposition and hatchability in Karl Jenter and Cupkit apparatus in varied bee strength *Apis mellifera* breeder colonies  
—*Navneet Kaur Dhaliwal, Jaspal Singh and Pardeep K. Chhuneja*
- 2072–2076 Environmental safety in the substantive training of bachelors of education in the field of life safety  
—*G.S. Kamerilova, M.A. Kartavykh, O.M. Filatova, E.N. Petrova and E.L. Ageeva*
- 2077–2082 Effect of osmotolerant endophytic bacteria for alleviation of water deficit stress in pearl millet  
—*Bapi Das, Sangeeta Paul and Maheshwar Singh Rathi*
- 2083–2089 Groundwater vulnerability and quality assessment using analytical hierarchy process  
—*S. Ajith Kumar and R. Vidhya*
- 2090–2095 Resources of obtaining biogas in the Republic of Kazakhstan  
—*Murat M. Kunelbayev, Marsel A. Kadyrov, Andrey A. Ponomarev, Nurzhan K. Bulatov and Railya M. Mukhamadeyeva*
- 2096–2100 Effect of zinc and boron on growth and yield of different cultivars of Garlic (*Allium sativum* L.)  
—*Hemlata Gorana, Om Singh, R. Gallani and S.S. Kushwah*
- 2101–2110 Prioritization of sub watershed for water conservation measures using remote sensing and GIS-a case study  
—*L. Yeshodha, S. Suresh Babu and V. Karthick*
- 2111–2117 Rheological study of Tamarind seed xyloglucan with Xanthan and Psyllium Husk Powder  
—*Kshitiz Kumar and Alok Saxena*
- 2118–2124 Studies to determine the performance parameters of mesophilic biogas plants with a low digester  
—*Varvara P. Druzyanova, Sophia A. Pe'rovà, Martha K. Okhlo'kova, Gavril À. Soloviov and Maria V. Sleptsova*

- 2125–2128 Growth performance and feed conversion efficiency of *Xiphophorus maculatus* (Gunther, 1866) Juveniles at different daily feeding rates  
—P.H. Sapkale, S.V. Patil, S.R. Yadav and M.J. Gitte
- 2129–2138 Assessment of groundwater quality parameters through spatial distribution mapping using GIS  
—R. Lilly and G. Ravikumar
- 2139–2144 Economic efficiency of processing of the wheel of large rigged cattle in the Mesophilic biogas equipment with small methane Tank  
—Varvara P. Druzyanova, Dmitry V. Filippov, Yuri Z. Dondokov, Ivan I. Sleptsov and Stanislav S. Fedorov
- 2145–2147 Comparative study on the contamination level of Dal Lake, Kashmir based on Total Viable Bacterial Counts over a period of time  
—Monisa Malik, M.H. Balkhi and Adnan Abubakr
- 2148–2155 Epidemiology and cultural characteristics of *Penicillium digitatum* causing head blight of Wheat  
—Sneha R. Patil, V.K. Parthiban, G. Raja Sekar and Sapana Baviskar
- 2156–2162 Radiation environment of Kazakhstan's Aktobe region territory  
—Kozy Kibatayev, Gulnur Urgushbayeva, Dina Yegizbayeva, Kulyan Shayakhmetova, Gulnura Kalbagayeva, Alima Kashkinbayeva, Yuliya Zame and Gulshara Abasheva
- 2163–2168 Observations on the predation of mosquito in presence of chironomid prey by *Toxorhynchites splendens* Wiedemann, 1898 (Diptera: Culicidae): implications in biological control of mosquito  
—Soujita Pramanik, Sampa Banerjee, Goutam K. Saha and Gautam Aditya
- 2169–2171 Performance of cowpea genotypes in Northern Dry Zone of Karnataka in summer season  
—H.D. Shilpa, S.Y. Wali, C.M. Mamathshree and T.G. Amrutha
- 2172–2180 Environmental protection activities: government control/regulation and environmental responsibility of business  
—M.S. Kozyrev, E.V. Frolova, N.V. Medvedeva, T.M. Ryabova, O.V. Rogach and T.A. Evstratova
- 2181–2187 Variation of soil pH, moisture, organic carbon and organic matter content in the invaded and non-invaded areas of *Tithonia diversifolia* (Hemsl.) A. gray found in Nagaland, North-east India  
—M. Romeo Singh\* and N. Theunuo
- 2188–2192 Phytosociological attributes of Indian Hazelnut (*Corylus colurna* L., Syn. *C. jacquemontii* Decne.) bearing forest: A wild edible nut of Western Himalaya  
—Dinesh Gupta, Manish Thakur and G.S. Shamet
- 2193–2198 Influence of city improvement on stray dogs population density in Yakutsk, Russia  
—M.M. Sidorov, M.L. Yakovleva, E.G. Shadrina and V.A. Danilov
- 2199–2205 Estimation of genetic relationship between raspberry and blackberry breeds using the RAPD markers  
—V.G. Lebedev, V.E. Padutov, I.A. Pozdnyakov and K.A. Shestibratov
- 2206–2209 Effect of plant growth regulators on quality, yield and growth of bottle gourd [*Lagenaria siceraria* (Molina) standl.]  
—Deepanshu, Pradeep Kumar Singh and Anita Kerketta
- 2210–2214 Phosphate adsorption capacity of fly ash: A comparative study between synthetic and raw waste water  
—B. Rout, T.K. Panda and B.B. Kar



- 
- 2215–2224 Climate change projections for Cuddalore district of Tamil Nadu, India using a regional climate model-PRECIS  
—*Thirumurugan Perumal, Krishnaveni Muthiah, Ramachandran Andimuthu, Prasanta Kumar Bal and Rajadurai Geetha*
- 2225–2228 Standardization of pulsing solution treatments for the postharvest life of Chinchinchee (*Ornithogalum thyrsoides* Jacq.) cut flowers  
—*D. Dastagiri, V. Bhargav and B.P. Sharma*
- 2229–2235 Diffusion of homestead technologies of Rajendra Agricultural University (RAU) among rural women of Bihar, India  
—*Veenita Kumari and R. Vasantha*
- 2236–2239 Scientific and methodological approaches to the study and evaluation of the impacts of habitat fragmentation with elements of Human infrastructure on biological diversity  
—*S.V. Bakka and N.Yu. Kiseleva*
- 2240–2246 Nutrient analysis of paper waste degenerated through the process of vermicomposting in an Institutional setup  
—*C. Amita Paul and Pawlin Vasanthi Joseph*
- 2247–2253 Growth and nutrient removal potential of two native hydrophytes (*Pistia* sp and *Salvinia* sp) from municipal sewage water of Sambalpur Town, Odisha, India  
—*Bilal Ahmad Mir and Sunanda Sahoo*
- 2254–2257 Seasonal variation in physicochemical properties of two pristine and polluted streams  
—*Roomi Jan, Abhilasha Bhawsar and Manzoor Ahmad Bhat*
- 2258–2263 Kinetics of carbon mineralization under different land uses and depths in South Kashmir of Lesser Himalayas  
—*Monisa Raza and Tahir Ali*
- 2264–2267 *Arachis hypogaea* farm fertilization using huddle Hierarchy with robustness against nutrient deficiency  
—*R. Varalakshmi*
- 2268–2274 Phytosociological studies of natural vegetation occurring in Nainital catchment area, Uttarakhand, India  
—*Maitreyie Narayan and Uma Melkania*
- 2275–2279 Effect of STCR based nutrient management on yield, nutrient uptake and profitability of maize (*Zea mays*) in an acid Alfisol of Northwestern Himalayas  
—*Shabnam, Sanjay K. Sharma, R.S. Rana and N.K. Sankhyan*
- 2280–2284 RAPD-PCR studies on bumble bees (*Bombus haemorrhoidalis* and *Bombus rufofasciatus*) and their important pests (*Physocephala tibialis* and *Aphomia sociella*)  
—*Avinash Chauhan, B.S. Rana, Manisha Thakur and Sapna Katna*
- 2285–2296 Consumers' perception towards organic food products-Vellore City, Tamil Nadu, India  
—*G. Velmurugan, V. Selvam, R. Subashini and D. Rajan*
- 2297–2301 Effect of bio-stimulants on growth and yield of chrysanthemum (*Dendranthema grandiflora* Tzvelev.) var. Amalfi under protected cultivation  
—*T. Vetrivel, M. Jawaharlal, R. Arulmozhiyan and M. Kannan*
- 2302–2309 Awareness of consequences of Air pollution among Urban students  
—*D. Ashok, V. Selvam and Ravi Chinta*
- 2310–2313 Industrial waste water treatment using membrane bioreactor  
—*K. Sathiya and S. Keerthinarayana*
- 2314–2318 Study of physicochemical and nutritional characteristics of dried mushroom  
—*Pradip Narale and Surendra Kothari*

- 
- 2319–2322 **Studies of water quality in Monsoon season at Yamuna river, Allahabad, India**  
—*Shweta Singh, Abhishek James and Ram Bharose*
- 2323–2328 **Effect of fly ash based organic application on plant biomass and bio concentration of of major and micro nutrients in nursery seedlings of *Simarouba gluca***  
—*L. Rajashekhar, G.P. Getha and R.K. Jhanvi*
- 2329–2339 **Evaluation of groundwater quality and its impacts on child health**  
—*Lavanya Vaithyanathan and Seetharaman Ravichandran*
- 2340–2345 **Analysis of leachate generated from untreated and treated coirpith**  
—*V. Priya, Sampath Kumar M.C. and N. Balasubramanya*
- 2346–2351 **Assessment of meadow soil resistance of the Azov Sea Region to pollution with heavy metals and oil**  
—*Sergey Ilyich Kolesnikov, Margarita Alekseevna Myasnikova, Tatyana Vladimirovna Minnikova, Tigran Aleksandrovich Ter-Misakyants, Kamil Shagidullovich Kazeev and Yuliya Viktorovna Akimenko*
- 2352–2357 **Effect of planting date on the yields of sugar beet variety in winter sown planting**  
—*Zohreh Nabipour, Davoud Habibi, Masoud Ahmadi, Dariush Fathollah Taleghani and Ali Kashani<sup>1</sup>*

# A study of strategic plan for conservation and society in the Seho small Island

Gun Mardiatmoko<sup>1</sup>, Agustinus Kastanya<sup>1</sup>, Debby Vemiancy Pattimahu<sup>1</sup> and Murianto Wenno<sup>2</sup>

<sup>1</sup>*Forestry Department, Faculty of Agriculture, Pattimura University, Ambon, Indonesia*

<sup>2</sup>*Politeknik Perdamaian Halmahera, Tobelo, Indonesia*

(Received 4 March, 2017; accepted 30 May, 2017)

## ABSTRACT

A strategic plan is one of the most important tasks that managers in organizations are to accomplish. The aim of the paper is to develop an appropriate strategy for the Nature Preserve of Seho Small Island. The determination of nature preserve area is based mostly on the western distribution of Matoa (*Pometia pinnata*) and it is necessary to protect. To reach this goal, this study applies SWOT analysis along with QSPM and spatial analysis from Geographical Information System to determine area zoning of Seho Small Island and the priority of the strategic management. The results showed that position of the management was located in Quadrant I. It means that the management face various Threats, but it still has the strengths from the internal aspects. The strategy necessary to develop was to use the strengths to utilize the opportunity, so that they can be used to solve weaknesses. Beside that, based on spatial analysis result it can be determined core zone, buffer zone and rehabilitation zone including watershed area.

*Key words* : Management strategic, SWOT analysis, QSPM, Zoning areas, Spatial analysis, *Pometia pinnata*, Conservation

## Introduction

Most of the conservation areas for the benefit of its inhabitants had been built especially in countries like America and Europe. They are obsessed with the beauty of the rich natural heritage. In fact, the concept of the development of the conservation area has been conducted in the southern region of the world, especially the tropics, including Indonesia (TII, 2016). Indonesia has natural forest resources and their ecosystems with high level of diversity, uniqueness, originality and beauty that are very potential natural resources. Therefore, it is necessary to develop and utilize for the greater welfare of people through the protection, conservation, and utilization of wild life areas and the natural conservation areas, which are the representation of ecosystem with diversity in flora and fauna, the sources of

germplasm in land and water, main function as life buffer and others. Forest conservation is very important mainly for nature preservation. Nature preserve is an area of land that is protected and managed in order to preserve type of habitat and its flora and fauna which are often rare or endangered (CED, 2012). In general, efforts to manage a nature preserve well in the fields is not easy and often make conflict among local communities or conflict between human and animal or other conflict of interest to manage a nature preserve.

In many countries, there were some conflicts appear in nature preserve management in the fields. There was threats in Van Long Nature Reserve Vietnam i.e. forest fire, unsustainable land use in the core zone of the reserve, rapidly growing tourism and the Cement Factory which is located next to the reserve (Nguyen, 2008); there was severe conflicts

reserve managers and local communities in Nangun river nature reserve, Yunnan, China (Kui, 2000) or the problems in protecting Khao Yai National Park, Thailand, i.e. rapid growth in population, exploitation of timber, land and energy, tourism and residential development (Panusittikorn and Prato, 2001); the conflict was found in conserving tiger and elephant habitat in India. As such, human beings and wild animals are forced to share common resources, which can result in human-wildlife conflict (Bargali, 2016); human-tiger conflict in Kerinci Seblat National Park, Sumatra, Indonesia (Nugraha and Sugardjito, 2009). Human-wildlife conflict is a serious obstacle to conservation world-wide and will become increasingly prevalent as human populations increase, development expands, the global climate changes, and human and environmental factors put people and wildlife in greater direct competition for a shrinking resource base (Madden, 2009). Moreover, human-wildlife conflict is often less a conflict between humans and wildlife and more a conflict between humans about wildlife. Natural resource conflicts have been exacerbated by the slow response National Park (NP) management for political and social dynamics are quickly exceeded the limits of NP, including: (a) A lack of clarity regarding the extent to which the public is involved in the management of NP; (b) The district proliferation / partition for decentralization that leads to the jurisdiction of some districts' now overlaps (sometimes entirely) with a conservation area, which leads to conflicts of authority between the district and the management of NP and (c) The failure of management of NP to demonstrate the contribution of real economic preserving nature to support community livelihoods and increase the gross domestic product of local government (TII, 2016).

In fact, many conflicts in nature preserve management from time to time in every country can not be resolved totally. In general, it can be resolved only partially and there is not an holistic conflict resolution. This situation can be illustrated as a Zeno's paradox. In this paradox, a man wishes to get from point A to point B. In order to traverse the distance, he has to traverse half the distance. In order to traverse the remaining half of the distance, he first has to traverse half of that distance, leaving one quarter of the total distance remaining to be traversed. But in order to traverse that distance, he first has to complete half of that. In this paradox, the man always goes half of the remaining distance and

never arrives (Sternberg and Grigorenko, 2007). Thus, we can only make many efforts to reduce conflict management in nature preserve or to minimize it gradually. Many approaches and techniques to handle conflict resolution, one of them is strategic planning application. A strategic plan is a tool that provides guidance in fulfilling a mission with maximum efficiency and impact. If it is to be effective and useful, it should articulate specific goals and describe the action steps and resources needed to accomplish them. As a rule, most strategic plans should be reviewed and revamped every three to five years. Strategic plans are comprehensive documents that cover all aspects of an organization's work, including programs and services, management and operations, fundraising and finances, facilities and governance. Depending on the organization's scope and emphasis, a plan might also describe approaches to enhance marketing, internal and external communications, membership development and administrative system (Mittenthal, 2002).

## Materials and Methods

The study was conducted in Seho Small Island (SSI) located in Sula Islands. SSI Nature Preserve is one of the conservation areas located in West Taliabu Sub-district, Taliabu Regency, North Moluccas Province. The selection of SSI as one of the nature preserve areas was based on Decree of the Minister of Transmigration, Republic of Indonesia, No. 492/Kpts/Um/10/1972 dated on October 14, 1972, and then determined as the nature preserve based on Decree of the Minister of Forestry No. 320/Kpts-II/1987 dated on October 12, 1987 with land size of 1,250 Ha. The villages selection was done in a purposive sampling technique. Bobong Village (Customary Village) and Wayo Village (Incoming Village) were selected as the sample of the study. The respondents were determined by a purposive sampling technique based on considerations among local community in doing activities and utilizing the forest area of SSI. Socio-economic and cultural data of community were obtained from questionnaires and indepth interviews with community and key informants. The steps in the study were the inventory of vegetation potentials in field and the inventory of socio-economic and cultural community. The identification of vegetation potentials in the forest area of SSI was carried out through the inventory of vegetation

potentials. The initial activities were to make the flow of observation and make the measuring plots of observation. In the inventory activity, the sample was collected by using a systematic sampling technique. The activities were carried out through direct interviews with local community with access to the forest area of SSI. The data were analyzed using a vegetation survey, SWOT, and QSPM analysis techniques. The analysis of SSI management plan was carried out by using the Geographical Information System (GIS) assisted by Arc Gis Ver. 10.1. The initial step of processing was carried out by importing data of Shuttle Radar Topographic Mission (SRTM) in a raster format and data of the land cover of Taliabu Island. The mission objective of SRTM is to obtain single-pass interferometric Synthetic Aperture Radar (SAR) imagery to be used for Digital Elevation Model (DEM), also referred to as DTM (Digital Terrain Model) generation, i.e. topographic maps. Coverage of the Earth's land surfaces is provided between the latitudes of  $-54^{\circ}$  and  $+60^{\circ}$ , representing nearly 80% of the land masses (Kramer, 2012). The results of the interpretation of Landsat 8 satellite images were in a vector format. Landsat 8 was developed as a collaboration between NASA and the U.S. Geological Survey (USGS). NASA led the design, construction, launch, and on-orbit calibration phases, during which time the satellite was called the Landsat Data Continuity Mission (LDCM). The Landsat 8 scene size is 185-km-cross-track-by-180-km-along-track. The nominal spacecraft altitude is 705 km. Cartographic accuracy of 12 m or better (including compensation for terrain effects) is required of Landsat 8 data products (Iron, 2016). The next step was to clip them in accordance with the studied areas. The process aims at gaining data of the area to be analyzed for the mapping. Several processes carried out to get the boundary maps, topographic and slope, and land cover of SSI as follows: (a) The initial step in making the boundary maps of SSI was started by making a fill accumulation and then making a flow accumulation. After the calculation of the number of existing flows in the studied area was carried out, the next step was to determine the boundary area in the studied area; (b) The topographic maps were made by using data of SRTM as results of clipping, then the reclassification of terrain height. The altitude determined was classified into five classes, i.e.  $< 100$  m,  $100 - 150$  m,  $150 - 200$  m,  $200 - 250$  m, and  $> 250$  m of above sea level; (c) The making of slopes was started by determining

the slopes, and then the re-classing of slopes. The determination of slope class was done for 5 classes, i.e. slope class  $< 8\%$  (plain),  $8 - 15\%$  (slope slightly),  $15 - 25\%$  (steep slightly),  $25 - 40\%$  (steep), and  $> 40\%$  (very steep), (d) The mapping of land cover was done based on the results of interpretation on the Landsat 8 satellite images. From the results of the image interpretation and groundcheck, the areas of SSI consisted of four classes of land cover, i.e. forest, mixed garden, mangrove, and settlement, (e) The making of SSI watershed map based on result of terrain height map, slope map and land cover map; (f) The data as the results of spatial analysis from GIS was than overlaid to get a picture of information about the morphology of boundary area in the sites of the study. A delineation process was carried out to the studied area based on the zonafication of management, including core zone, buffer zone, and utilization zone. The determination of zonafication in the studied area was carried out by considering the characteristics and morphology of boundary area in the site of the study. Final map production was overlapping between watershed map and zoning area of core, buffer and rehabilitation map; (g) Implementation of strategic plan for nature preserve of SSI. The data obtained were then analyzed by using a SWOT analysis method. The SWOT analysis was basically the identification of various determining factors. The analysis of such strategic factors consisted of the analysis of internal and external factors. The analysis of internal factors was carried out by formulating a matrix of Internal Strategic Factors Analysis Summary (IFAS) and external factors by formulating a matrix of External Factors Analysis Summary (EFAS). The next step was to make a list of priority to be implemented. Quantitative Strategic Planning Matrix (QSPM) was a technique that can objectively be applied as the prioritized rank alternative strategy (David, 2006).

## Results

### Socio-cultural and biodiversity aspect in SSI

Based on the history of region, Seho Island is one of the small islands in Taliabu Island Regency and adjacent with Kano Island and land of Taliabu Island. SSI has sufficiently good biodiversity and resource utilized by community within and around the forest area of SSI. According to history, initially the community occupying the Seho Island and Bobong land



is the original tribe of Taliabu consisting of Mangee Tribe, Seboyo Tribe, and Kadai Tribe. Derivations of the three tribes are: Panto Tribe (Lifung clan, Kapita clan, Laribunga clan, a mix of Tobelo), and Jojano clan. From the story of community, the tribe occupied Seho Island since 1913, particularly since the incoming of one of the missionaries from Ambon, i.e. Priest Popoko Daruba. Meanwhile, the community occupied the land of Taliabu Land in Bobong since 1960s that initially occupy old village/old Bobong. In addition to the tribes above, there are also other tribes such as Bugis Tribe as well as Buton Tribe occupying the lands of Taliabu Island. All the tribes are considered as the incoming tribe/community.

Biodiversity aspect in SSI can be illustrated through the Important Value Index (IVI) approach. An IVI which was the summation of tree relative density, relative frequency, and relative basal area was used to define tree dominance (Barker *et al.*, 2002). The results of the IVI calculation in SSI at each step of tree growth as follows: at the seedling level, the results of the IVI calculation showed that the *Shorea* sp had the higher IVI than other species. The IVI of *Shorea* sp was 92.46%, while that of *P. pinnata* was 14.35%. This means that at the seedling level the dominating species was the *Shorea* sp, this is because the type of wood has a relatively higher value than others. In the inventory activity, the species of several vegetations are not known.

**The Watershed-based forest management and zoning area of SSI**

Based on results of the overlay of land cover map, slope map, and altitude map, the map of watershed and the map of zoning area in SSI were made. These maps were re-overlaid for the combined map between the map of watershed and zoning areas for SSI as presented in Fig. 1 and 2.

Core zone is a nature preserve area, which is not disturbed by human activities (undisturbed core area). Only research, education, training, and monitoring activities are allowed. The core zone is the forest area of SSI (1,250 ha) located in the area of nature preserve. The core zone has a land cover such as a forest area located in the central part of SSI and non-forest area. Buffer zone is an area around the core area or the wild life area. The size of buffer zone determined is 664.64 ha. The area of buffer zone has topography such as plain to hilly regions with height ranging from 0 to 250 meter of sea level

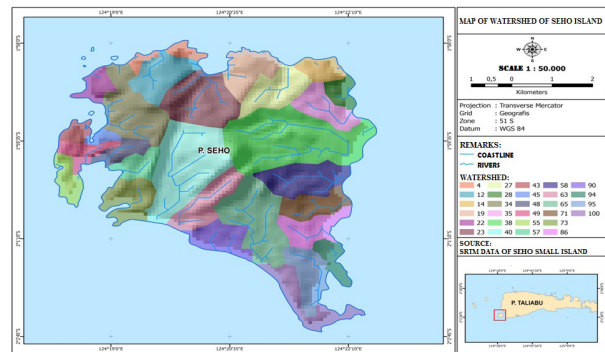


Fig. 1. The Watershed of SSI

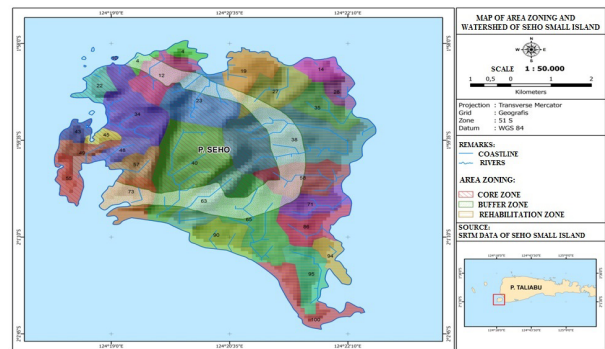


Fig. 2. The Combined maps of watershed and zoning areas for SSI (Source: Wenno *et al.*, 2016).

with areal slopes ranging from 0 to 40%. Rehabilitation zone is an area outside the area of buffer zone. Land cover in this zone is such as mixed garden, local community settlement and mangrove forest area in the coastal area of the zone. Beside that, there are community settlement areas in this zone. The area of rehabilitation zone is 1,758.36 ha. It has topography such as plain region with altitude ranging from 0 to 200 meter of sea level with slopes ranging from 0 to 40%. The results of field observation showed that in the zone most of the areas were no longer forests, but the areas of mixed garden.

**Analysis of the strategic plan and QSPM**

The first step in implementation the strategic plan analysis is identification of internal and external factors and followed by a SWOT analysis. Several internal and external factors that become the considerations to determine the priority of plans in the management of SSI Nature Preserve were as follows:

- a. Strengths: (a) it is determined as the wild life conservation area based on Decree of the Ministry of Forestry, the Republic of Indonesia Number 320/KPTS-II/1987 date on 12 October

1987 with size of 1,250 Ha, (b) it has diversity in flora, particularly *hosa* wood species, (c) it is a forest area as a buffer zone for the life of surrounding community, (d) the presence of mangrove forest along seashore as a green belt, (e) It is a type of the wet tropical rain forest ecosystems that have a sufficient good community growth and have a salodic formation.

- b. Weaknesses: (a) The unavailability of data on potentials and information of wild life, (b) The minimum infrastructure in the area management, (c) The overlapping of the area and lands owned by local community, (d) The low level of education among local communities, (e) Lack of the controlling function of area manager.
- c. Opportunities: (a) The support by Central Government in the policy of biological natural resource conservation and its ecosystems, (b) Sufficient perception among local communities about the existence of conservation in the protection of area, (c) The willingness and consciousness of local communities to directly involve in the management of area, (d) The strong and existing order of local culture, (e) The presence of mangrove forest that can be developed as the natural tourism object around the area, (f) The advances of technology and science.
- d. Threats: (a) The access of local community around the area to the forest by clearing the area for the mixed garden, (b) The activity of forest clearing out and illegal logging, (c) The hunting and trading of wild animals, (d) The low enforcement of law, (e) The claim of customary land/right by local communities in the area

Based on the results of data processing in the matrix of evaluation on internal and external strategic factors, it can be known the values of each matrix, which then will be included into the quadrant analysis. The value of matrix in the evaluation of internal strategic factors was: the total of Strengths – the total of Weaknesses =  $2.826 - 2.00 = 0.826$ , while the value of matrix in the evaluation of external strategic factors was: the total of opportunities – the total of threats =  $2.628 - 2.200 = 0.428$ . The value of matrix in the evaluation of internal strategic factors is presented in Fig. 3.

Based on Figure 3, the results of quadrant analysis show that position of the management of SSI Nature Preserve was located in Quadrant I. The position describes that the management of SSI Nature

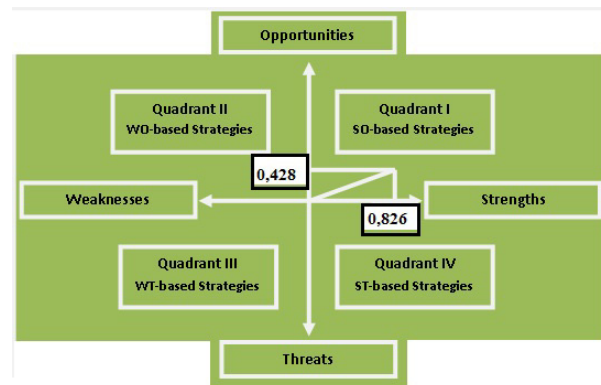


Fig. 3. The Value of matrix in the evaluation of internal strategic factors

Preserve face various Threats, but it still has the strengths from the internal aspects. The strategy necessary to develop was to use the strengths to utilize the opportunity, so that they can be used to solve weaknesses.

In addition to stratified strategies for the list of priority, there was only one analysis technique in literature that was designed to determine a relative attraction of feasible alternative action. The technique was Quantitative Strategic Planning Matrix (QSPM). The advantage of QSPM is that a set of strategies can be evaluated gradually or collectively. As an example, the level of corporation can be evaluated first, followed by the strategy at division level and the strategy at functional level. There was limitation in the number of strategies that can be evaluated or the number of strategies that can be evaluated in a time using QSPM. It can be stated that whether you are more supportive of the "emergent" or "deliberate" approach to strategic planning, there is widespread agreement that formulating strategies begins with development of a clear vision and mission, followed by an internal and external assessment, which leads to establishing long term objectives, and finally generate and decide among specific strategies to pursue (David *et al.*, 2009).

The priority of strategies that will be implemented was determined through the evaluation on the alternative options of strategy with QSPM approach. The step was carried out to determine which strategies were considered as the best to implement. The QSPM matrix will determine the relative attractiveness of strategy on the key factors from internal and external environment. Several SO-based strategies selected including: (a) The optimization of the

management of SSI Nature Preserve with priority on the ordering of areal boundary, (b) The increase compatibility in function of the utilization of nature preserve area in accordance with the regional spatial plan, (c) The increase of local community participation and collaboration with other stakeholders in the

management of nature preserve area, (d) The application technology in the management of nature preserve area, and (e) The promotion and development of other ecotourism around the nature preserve area. Based on the calculation of QSPM, it can be concluded that the priority of strategy was deter-

**Table 1.** The SWOT analysis of SSI Nature Preserve

No.	Internal Strategic Factors	Weights		Scale	Value
		Absolute	%		
<b>Strengths</b>					
1.	It is determined as the wild life conservation area based on Decree of the Ministry of Forestry, the Republic of Indonesia Number 320/KPTS-II/1987 date on 12 October 1987 with size of 1,250 Ha,	4	0.174	3	0.522
2.	It has diversity in flora, particularly <i>hosa</i> wood species	4	0.174	3	0.522
3.	It is a forest area as a buffer zone for the life of surrounding community	4	0.174	3	0.522
4.	The presence of mangrove forest along seashore as a green belt	3	0.130	3	0.390
5.	It is a type of the wet tropical forest ecosystem with a sufficiently good community growth.	4	0.174	2	0.348
6.	It is a type of the wet tropical rain forest ecosystems with a sufficiently good community growth and a salodic formation.	4	0.174	3	0.522
	Total	23	1.00		2.826
<b>Weaknesses</b>					
1.	The unavailability of data on potentials and information of wild life	3	0.20	2	0.40
2.	The minimum infrastructure in the area management	3	0.20	2	0.40
3.	The overlapping of the area and lands owned by local community	3	0.20	2	0.40
4.	The low level of education among local communities	3	0.20	2	0.40
5.	Lack of the controlling function of area manager	3	0.20	2	0.40
	Total	15	1.00		2.00
No.	External Strategic Factors	Weights		Scale	Value
		Absolute	%		
<b>Opportunities</b>					
1	the support by Central Government in the policy of biological natural resource conservation and its ecosystems	4	0.182	3	0.546
2	Sufficient perception among local communities about the existence of conservation in the protection of area	4	0.182	3	0.546
3	The willingness and consciousness of local communities to directly involve in the management of area	4	0.182	2	0.364
4	The strong and existing order of local culture	3	0.136	3	0.408
5	The presence of mangrove forest that can be developed as the natural tourism object around the area	4	0.182	3	0.546
6	The advances of technology and science	3	0.136	2	0.272
7	Total	22	1.00		2.628
	(1), (2 (3), (4), (5) the advances of technology and science.				
<b>Threats</b>					
1.	The access of local community around the area to the forest by clearing the area for the mixed garden	3	0.20	2	0.40
2.	The activity of forest clearing out and illegal logging	3	0.20	2	0.40
3.	The hunting and trading of wild animals	3	0.20	2	0.40
4.	The low enforcement of law	3	0.20	2	0.40
5.	The claim of customary land/right by local communities in the area	3	0.20	3	0.60
6.	Total	15	1.00		2.20



mined by evaluating the ranking of strategies based on the value of Total Attractive Score (TAS) from the largest to the smallest. The order can be seen in Table 2 as follows:

The status of customary community land ownership is actually divided by customary figure with average land ownership size of 5 - 20 Ha. Meanwhile, lands for the incoming community for gardening are gained by buying them and there are also given for free by the customary community. Based on customary norms, the criteria usually used in determining the status of land ownership as the borders are dead rivers, stones and big trees. Community living within a forest area will usually affect the condition of biodiversity in a forest area. This can be seen from the community activities in an area because they greatly need the potentials of existing natural resources in a natural area. The need for the natural resources is to meet their daily life needs. The forest area of SSI with the altitude ranging from 0 to 250 m of above sea level has various type of ecosystem, including the type of low plain forest ecosystem, coastal and mangrove forest ecosystem. The forest area of SSI has in part been determined as nature preserve area. The determination of nature preserve area is based on the mostly western distribution of *P.pinnata*, and it is necessary to protect. Based on agroforestree database, *P. pinnata* is a medium-sized to fairly large tree up to 40-47 m tall, with bole up to 100-140 cm in diameter. Leaves with 3-13 pairs of leaflets having dentate margins and alternate secondary veins ending in a tooth. Inflorescence and calyx often hairy. Native from India, Papua New Guinea, Philippines, Solomon Islands, Sri Lanka. *P. pinnata* occurs in primary and secondary forest (Orwa *et al.*, 2009). Moreover, *P. pinnata* is adapted to the warm to hot, humid and wet subtropical to tropical region from 14° N to 20° S with mean annual rainfall ranging from 1,500 to 5,000 mm. In its native range in Malesia, it is found in undisturb mixed dipterocarp, forests up to 700 m

altitude, often on alluvial sites and along or near rivers and streams, but also on hillsides. In secondary forest it is usually present as a pre-disturbance remnant (Lim, 2013). In the SSI forest area, there are the types of commercial wood such as White Meranti (*Shorea sp.*), Red Meranti (*Shorea selanica*), Bintanggur (*Calophyllum sp*), Kayu Besi (*Intsia bijuga*), Palapi (*Heritiera sp*), Gondal (*Ficus variegata*), Sengon (*Albizia sp*) and Rattan (*Calamus sp*). In addition, there are also other forest products such as sago and natural jasmynes. These types can be utilized by local community to meet daily life needs and increase their income.

## Discussion

### Socio-cultural and biodiversity aspect in SSI

From the results of interview with community in SSI, it can be known that especially the original tribal community usually utilizes the forest products only from their own land/customary land and they are not necessary to ask permission. For the nature preserve area, community within SSI is not brave to enter the nature preserve area to collect woods, although from the results of the field observation, it can be seen that there are the customary community lands included into the land of nature preserve. This is because the community within SSI considered that the nature preserve area has been owned by government after being established as the nature preserve area, so that by their self consciousness, they often make protection and inspection over the area. However, there are communities outside SSI, such as those from Bobong, Wayo, Luwuk, and others that enter to collect woods within the nature preserve area of SSI. For the incoming community, they may collect the forest products such as woods but must gain permission from the customary tribal community and must report to the head of village. The woods collected are also only for certain neces-

**Table 2.** Result of Quantitative Strategic Planning Matrix (QSPM)

No	Alternative Strategies	TAS
1.	Optimization of the Nature Preserve of Seho Island with priority on the ordering of areal boundary	<b>11.59</b>
2.	The increase of compatibility in nature preserve area utilization with the regional spatial plans	<b>10.87</b>
3	The increase of community participation and collaboration with other stakeholders in the nature preserve management.	<b>9.78</b>
4.	The application of technology in the Nature Preserve of Seho Island.	<b>10.22</b>
5.	The promotion and development of other natural tourism destination around the nature preserve area.	<b>10.98</b>

sity within the village, but not to sell outside the village.

Based on biodiversity in SSI, the results of the IVI calculation at the sapling level showed that white *Shorea* sp had the highest IVI value of 36.70%, *Agathis* sp 33.00%, *S. selanica* 27.61%, *F. variegata* 23.91%, and one of the unknown species had the lowest IVI value of 12.79%. For the poles level, the species *Lixe* sp has higher IVI value than that of other species of wood. The IVI value of *Lixe* sp was 64.72%, *S. selanica* was 62.89% and *Shorea* sp was 58.32%. It can be explained that at the poles

level, the area was largely dominated by species of *Lixe* sp, followed by the species of *S. selanica* and *Shorea* sp. At the poles level, the lowest IVI was other commercial species with IVI of 24.31%. For the tree level showed that there are several species of vegetations dominating the SSI forest area. The mostly dominant species at tree level was *Lixe* sp with IVI value of 94.82%, followed by the species of *S. selanica* with IVI of 47.17%, *Shorea* sp of 39.34%. Meanwhile, the lowest IVI was *Albizia* sp with IVI of 3.52%. The inventory of fauna species both bird and mamalia was obtained from interview with commu-

**Table 3.** The First five-years period

No	Strategies	Activities	Projection
1	Optimization of the management of SSI Nature Preserve with priority on the re-determination	<ul style="list-style-type: none"> <li>a. Inventory and identification of the potentials of SSI Nature Preserve</li> <li>b. The arrangement of database and information on the area of areal boundary</li> <li>c. The re-determination of boundaries and the determination of management block</li> </ul>	The achievement of area function conservation
2	The increase of compatibility in nature preserve area utilization with the regional spatial plans	<ul style="list-style-type: none"> <li>a. The inventory of ecological, economic and social potentials for community</li> <li>b. The management of area potentials in accordance with the regional spatial plans</li> <li>c. The protection of nature preserve area</li> </ul>	The compatibility of wild life area utilization function and the Regional Spatial Plans
3	The increase of community participation and collaboration with other stakeholders in the management of nature preserve	<ul style="list-style-type: none"> <li>a. The involvement of community and other stakeholders in the arrangement of comprehensive management plans</li> <li>b. The strengthening of area management resource capacity</li> </ul>	The role of community and other stakeholders in an integrative manner
4	The application of technology in the management of SSI Nature Preserve.	<ul style="list-style-type: none"> <li>a. The inventory of needs for the area management activities requiring technological innovation</li> <li>b. The utilization of technology in utilizing the area management by preparing web-based database.</li> </ul>	The achievement of innovative area conservation
5	The promotion and development of other natural tourism destination around the nature preserve area.	<ul style="list-style-type: none"> <li>a. The inventory and identification of area potentials for natural destination activities</li> <li>b. The preparation of supportive facilities for natural tourism activities around the area</li> </ul>	The distribution of data and information about SSI Nature Preserve

nity, the recognition of voice, through nest, and the tracks of feet found in the SSI. The wild animal species of SSI include Moluccan babirusa (*Babyrousa babyrousa*), Sula scrubfowl (*Megapodius bernsteini*), Pied-Imperial-pigeon (*Ducula bicolor*), Wild boars (*Sus scrofa*), Rusa deer (*Cervus timorensis*), Blyth's hornbill (*Rhyticeros plicatus*), White cockatoo (*Cacatua alba*), Brahminy kite (*Haliastur indus*), Sula Barn-owl (*Tyto nigrobrunnea*), and Citrine lorikeet (*Trichoglossus flavoviridis* Wallace). Meanwhile, according to local community living around the SSI, the wild animal species in Seho Island include pig, deer and deer pig as those often hunted by local community.

The results of calculation of IVI entirely showed that at the level of seedling and sapling, the genus of Shorea, particularly *Shorea* sp, largely dominate, while at poles and tree levels it is dominated by the species of *Lixe* sp. In other word, at seedling and sapling levels, the species of *Shorea* sp has sufficiently good regeneration level. However, at pole and tree levels, the species of *Shorea* sp no longer dominated.

This can be due to competition among the species and also due to the activity of wood collection by the surrounding community. From the results of the calculation of IVI, it can be known that the species of *P. pinnata* was only found at the levels of seedling. Meanwhile, at sapling, poles and tree level, the species of *P. pinnata* was not found. Thus, there is need of much effort to maintain *P. Pinnata* through enrichment planting and seedling maintenance mainly in core zone of SSI.

The potentials found in SSI will be threatened by the excessive forest exploitation by the surrounding community. Therefore, the policy to conserve the existing potentials should be made and applied. In general, one of the local wisdom forms in SSI is a rule to not collect and utilize any woods excessively. In addition, related to the forest management, local community that want to collect woods from SSI must report to customary chief. This is because the authority to make a decision about permission to collect woods is owned by the customary chief. In the past, there was a customary ceremonial place in

**Table 4.** The Second five-years period

No	Strategies	Activities	Projection
1	The optimization of the management of SSI Nature Preserve with priority on the re-determination of areal boundary	a. The maintenance of area boundaries b. The reconstruction of lost/damaged area boundaries	The achievement of area function conservation
2	The increase of compatibility in wild life area utilization with the regional spatial plans	a. The handling of inventory results through database management in accordance with regional spatial plans b. The development of data monitoring, evaluation, and reporting system	Compatibility of nature preserve area utilization function and the Regional Spatial Plan
3	The increase of community participation and collaboration with other stakeholders in the management of nature preserve.	c. The involvement of community and other stakeholders in the arrangement of comprehensive management plan	The role of community and other stakeholders in an integrated manner
4	The application of technology in the management of SSI Nature Preserve.	a. The development of web-based area promotion tools and other multimedia	The achievement of innovative area management
5	The promotion and development of other natural tourism destination around the nature preserve area.	a. The development and management of other natural tourism destination centers around the area b. The development of small business among community favor of the natural tourism	The distribution of data and information about SSI Nature Preserve

SSI regarded as a forbidden place. However, over times, the place has no longer existed. The ceremonial place is usually used not only for customary ceremony, but also for keeping tools such as lance, machete, and so on. Community still applied non-irrigated agriculture and their life is not settled. Usually if any member of the family dead, local community will move and seek a new land, and follow a cycle of 3-4 years to move into a new land. Customarily, the new land that will be cleared out is usually treated by customary ceremony by giving foods for the forest by Areca and the land is then cleared out and opened. The customary community in the Taliabu Island has also opened for new strange people. This can be seen from the fact that a newly coming community starts to occupy Taliabu Island. The presence of newly coming community will greatly affect the existence and conservation of ecology, the socio-cultural aspects of customary community in SSI and Taliabu Island. If the external community come, external culture will also affect the existing original culture in the local community in SSI and Taliabu Island. In this case, custom and culture of society related to the management of forest will lost because the external culture comes from the outside.

The life of local community in SSI is generally almost the same, both in livelihood and education level. Generally the main livelihood of local community is farming. Agricultural plants mostly utilized by the surrounding local community include tubers, coconut, durian and clove. In addition to the species of agricultural plants, there are also the species of forestry plants often utilized by the surrounding community, such as *Agathis* sp, *Shorea* sp, *Albizia* sp. All the species were utilized to meet their need for life, such as for consumption and to build house or to be sold and the money can be used to meet other needs. Other potentials often used by the local community around SSI were wild animals. The wild animals found in the SSI forest are basically hunted frequently. The wild animals are hunted for consumption and to be sold. The species of wild animal often hunted include deer pig, pig, deer and cockatoo.

### **The Watershed-based forest management and zoning area of SSI**

Watersheds in SSI as presented in Figure 1 are largely damaged due to the clearance out of forest

by community around the forest area, both for settlement and agricultural land. The clearance out of forest led to the decreased size of forest in watershed of SSI. In general, the decreased forest area impacted on the decreased water carrying capacity in the watershed area due to the low capacity of infiltration. Forest is an area for water absorption that is very useful for the conservation of water reservoir around the area. Land use change from forest into settlement or agricultural area in a watershed will affect hydrological quality. The core zone as the wild life conservation area should be conserved for the forest sustainability. In the watershed-based forest management in SSI, the core zone should be conserved as forest through replantation, particularly in the areas dominated by mixed garden or agroforestry area. In the core zone, one of the vegetation species that can be planted is *P. pinnata*, because it is an endemic species in the SSI area. This should be done in order that the nature preserve of SSI can be conserved as the most western area for the distribution of *P. pinnata*. The replantation activity is not only carried out in the core zone, but also in watersheds located in buffer zone and rehabilitation/transitional zone, particularly in mixed garden areas. This was because the watershed condition with land cover of mixed garden will greatly affect the hydrological condition of each watershed. Selection of replantation area can be found more easily by using the combined map of watershed and area zoning of SSI as presented in Figure 2. Based on the result of GIS processing, maps combination of watershed and zoning areas can be made well and it is useful for managing SSI Nature Preserve. In this case, we can make nature preserve planning in short term or long term period and also planning of replanting *P. pinnata* and *Shorea* in watershed which have low density of vegetation.

### **Analysis of the strategic plan and QSPM**

Based on analysis of the strategic plan and the calculation of QSPM, it can be known the priority of the strategies determined by the ranking of strategies based on the values of TAS from the highest to the lowest as follows:

It is expected that the breaking of activities in accordance with the priority of strategies helps to achieve the objectives and outcomes in detail in terms of achieving the goals of management in the periods of five years and ten years.



## Conclusion

Position of the management of SSI Nature Preserve was located in Quadrant I. It means that the management face various Threats, but it still has the Strengths from the internal aspects. The strategy necessary to develop was to use the strengths to utilize the opportunity, so that they can be used to solve Weaknesses. The ranking of strategies based on the values of TAS from the highest to the lowest: (a) Optimization of the management of SSI Nature Preserve with priority on the re-determination of areal boundary, (b) The increase of compatibility in nature preserve area utilization with the regional spatial plans, (c) The increase of community participation and collaboration with other stakeholders in the management of nature preserve, (d) The application of technology in the management of SSI Nature Preserve, and (e) The promotion and development of other natural tourism destination around the nature preserve area. Beside that, based on spacial analysis result it can be determined core zone, buffer zone and rehabilitation zone including watershed area. Availability of these maps is very useful for improving forest land degradation in SSI Nature Preserve mainly in enrichment planting of *P. pinnata*.

## Acknowledgements

The authors would like to acknowledge the Maluku Natural Resources Conservation Agency (BKSDA Maluku) for the financial support on this research in 2014.

## References

- Bargali, H.S. 2016. Conserving Tiger and Elephant Habitat in India. Earthwatch Institute. [http://www.earthwatch.org/briefings/web\\_earthwatch\\_conserving\\_tiger\\_elephant\\_habitat\\_india\\_2016](http://www.earthwatch.org/briefings/web_earthwatch_conserving_tiger_elephant_habitat_india_2016). [accessed April 02, 2016]
- Barker, J.R., Ringold, P.L and Bollman, M. 2002. Patterns of Tree Dominance in Coniferous Riparian Forests. *Forest Ecology and Management*. 166 : 311-329.
- CED. 2012. Collins English Dictionary-Complete & Unabridged. Digital Edition. <http://www.dictionary.com/browse/nature-preserve>. [accessed March 21, 2016]
- David, F.R. 2006. *Strategic Management*, 10<sup>th</sup> Edition, Salemba Empat, Jakarta, pp. 63-67
- David, M.E., David, F.R. and David, F.R. 2009. The Quantitative Strategic Planning Matrix (SQPM) applied to a retail computer store. *The Coastal Business Journal*. 8 (1) : 42-52.
- Iron, J.R. 2016. Landsat 8. Landsat Science, NASA., <http://www.landsat.gsfc.nasa.gov/?p=3186>. [accessed April 03, 2016]
- Kramer, H.J. 2012. Observation of the Earth and Its Environment: Survey of Missions and Sensors. <http://www.directory.eoportal.org/web/eoportal/satellite-missions/s/srtm>, [accessed April 03, 2016]
- Kui, L.Q. 2000. Community Forestry and Conflict Management: A Case Study Nangun River Nature Reserve, Yunnan, China. <http://www.m.mekonginfo.org/assets/midocs/0002267/-environment-community-forestry-and-conflict-management-a-case-in-nangun-river-nature-reserve-yunnan-china.pdf>. [accessed March 28, 2016]
- Lim, T.K. 2013. *Pomea pinnata*. Edible Medicinal and Non-Medicinal Plants, 6:1-2. Springer Science + Business Media Dordrecht., <http://www.link.springer.com/chapter/10.1007/978-94-007-5628-1-15#page-1>. [accessed January 17, 2016]
- Madden, F. 2009. Human-Wildlife Conflict: Resolution through Collaboration and Innovation. Wild Solutions: Overcoming Human-Wildlife Conflict Issues. Center for Tropical Ecology and Conservation 6<sup>th</sup> Annual Symposium. Antioch University. New England. <http://www.antiochne.edu/centerfortropicalecology/events/wildsolutions3/> [accessed March, 30, 2016]
- Mittenthal, R.A. 2002. Ten Keys to Successful Strategic Planning for Nonprofit and Foundation Leaders. Briefing Paper. TCC Group, [http://www.tccgrp.com/pdfs/per\\_brief\\_tenkeys.pdf](http://www.tccgrp.com/pdfs/per_brief_tenkeys.pdf) [accessed April 01, 2016]
- Nguyen, D. 2008. Van Long Nature Reserve Vietnam. [http://www.iccaconsortium.org/wp-content/uploads/images/media/grd/van\\_long\\_vietnam\\_report\\_icca\\_grassroots\\_discussion.pdf](http://www.iccaconsortium.org/wp-content/uploads/images/media/grd/van_long_vietnam_report_icca_grassroots_discussion.pdf). [accessed March 28, 2016]
- Nugraha, R.T. and Sugardjito, J. 2009. Assessment and Management Options of Human-Tiger Conflicts in Kerinci Seblat National Park, Sumatra, Indonesia. *Mammal Study*. 34, (3): 141-154.
- Orwa, C., Mutua, A., Kindt, R and Anthony, S. 2009. Agroforestry Database: A Tree Reference and Selection Guide Version 4.0., [http://www.worldagroforestry.org/treedb/AFTPDFS/Pometia\\_pinnata.PDF](http://www.worldagroforestry.org/treedb/AFTPDFS/Pometia_pinnata.PDF). [accessed April 02, 2016]
- Panusittikorn, P and Prato, T. 2001 Conservation of Protected Areas in Thailand: The Case of Khao Yai National Park. *The George Wright Forum*. 18(2): 66-76
- Sternberg, R.J. and Grigorenko, E. 2007. *Teaching for Successful Intelligence: To Increase Student Learning and Achievement*, 2<sup>nd</sup> ed. California: Corwin Press, p. 79
- III. 2016. Nature Conservation: The Choice is There, The Decision is Ours. Tropenbos International Indonesia. The Jakarta Post. Paper Edition. <http://www.thejakartapost.com/news/2016/02/29/nature-conservation-the-choice-there-decision-ours.html>, [accessed March 02, 2016]
- Wenno, M., Kastanya, A. and Iskar. 2016. Pengelolaan Hutan Pulau Seho Sebagai Model Konservasi Pulau Kecil di Kabupaten Pulau Taliabu. *Jurnal Hutan Pulau-Pulau Kecil*. 1 (1) : 11-22.