

**PROCEEDINGS OF THE FIRST
UNDERGRADUATE RESEARCH SYMPOSIUM
ORGANIZED BY THE DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT**

26TH JANUARY 2017

**RAJARATA UNIVERSITY OF SRI LANKA
MIHINTALE**



**Extended Abstracts of First Environmental Management Undergraduate
Research Symposium, Department of Environmental Management
Faculty of Social Sciences & Humanities
Rajarata University of Sri Lanka, Mihintale -2017**

The corresponding authors are responsible for the contents of the papers

EMURS-2017

ISSN 2550-2646

Cover Design By

LRMO Lankarathna

DM Nadeera Harshajith

Page Layout By

DBMP Punchihewa, BND Dissanayaka, KWMP Senadheera, DDY Peiris,
HMCHB Herath, SN Kodithuwakku, DMU Sripali, KE Dewaraj

Printed By

Nethwin Printers (PVT) Ltd,

“Dalada Sevane Api Padanama”

Gatambe, Kandy.

TP 081 238 6908

Published By

Department of Environmental Management,

Faculty of Social Sciences & Humanities,

Rajarata University of Sri Lanka,

Mihintale.

www.urdoem.com



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MESSAGE FROM THE CHIEF GUEST

Vice Chancellor of Rajarata University of Sri Lanka



It is highly appreciated the efforts of the students and the Department of Environmental Management for creating a research culture by initiating an undergraduate research symposium on Environmental Management. As the Vice Chancellor, it is a pleasure to see that the students are taking leadership to organize a research symposium in order to show case their academic improvements.

United Nations' sustainable development goals for the next 15 years require particular attention on rational management of environmental problems globally. As the future focus is depend on the present younger generation, university students as the future leaders, provision of opportunity for staging their innovative research findings, is an excellent endeavour.

I believe this would be the first such initiation by the students following Environmental Management study Program of the Rajarata University of Sri Lanka and will be an example for others.

I wish all the success of these deliberations and thankful to the staff behind this for necessary guidance to the students.

Prof. Ranjith Wijayawardana

MESSAGE FROM THE DEAN OF THE FACULTY OF SOCIAL SCIENCES & HUMANITIES



Symposiums greatly provide a platform to encourage research relationship among scholars all over the world. The first national Undergraduate Research Symposium has been organized by the Department of Environmental Management in Faculty of Social Sciences & Humanities, of Rajarata University of Sri Lanka with the aim to enhance research culture among undergraduate in meeting the challenges of environmental sustainability.

As the Dean of the faculty of Social Sciences and Humanities I am privilege to issue a message to the first environmental undergraduate research symposium on staging young researchers for Environmental Management. This is a golden opportunity for undergraduate researchers to share their knowledge, experiences and outcomes of researchers. This kind of immense effort will be a rare opportunity for those in our university to gather and then expand the knowledge of the undergraduates of the university around the country.

My heartiest congratulations to the Department of Environmental Management on the efforts made to hold this research symposium with an eye to sharing the knowledge of the whole university community with those in the society in collaboration with the other universities.

Dr. Chandana R. Withanachchi

MESSAGE FROM THE HEAD OF THE DEPARTMENT OF ENVIRONMENTAL MANAGEMENT



Welcome to the First Undergraduate Research Symposium of the Department of Environmental Management, of the Faculty of Social Sciences and Humanities.

The Department which was created only a year ago, is thriving amidst many challenges, with competent teachers, dedicated researchers, and persevering students, all working together for the benefit of all. It offers both Social sciences oriented as well as science-based curricula. The primary focus of our endeavours is to impart technically and socially advanced knowledge to students, and enhance their problem-solving skills and innovations. The Department also offers a large number of optional courses for providing a wide spectrum of options to the students to pursue their varied interests. The course contents are in the process of being updated for accommodating new developments.

Undergraduate students who are enrolled in the Department are encouraged to undertake various research projects. At present, the Department maintains active research groups among the staff for carrying out collaborative and interdisciplinary research studies on contemporary local problems such as drought mitigation and the dreaded kidney disease. We have a modest ensemble of state of the art research facilities to support our efforts.

The Undergraduate Research Symposium is an annual showcase for undergraduate student researchers to present the results of their work to the university community as well as to other interested parties. Therefore, a large number of student researchers, including those from the RUSL's Undergraduate Research Opportunity Program, present their work as presentations. We also thank students and researchers from other universities for contributing to this symposium and their attendance in the seminar proceedings. I also take this opportunity to express our gratitude to the Vice Chancellor and the University, The Dean of the Faculty of Social Sciences and Humanities and his staff, and all our academic and non-academic colleagues who have generously supported us in various ways to make this event a success.

Mr. NSK Hearath

MESSAGE FROM THE CHIEF EDITOR



It is my pleasure to note that the staff and the students of the Department of Environmental Management have initiated a program to disseminate knowledge pertaining the research findings of the students from their undergraduate research. This is an opportunity to stage young scientists in the country to productive use of their research efforts. It is also a good sign that the initiation was launched within one year of the establishment of the Department. The symposium stages innovative research findings produced by educated youth related to various issues in environmental management in the country. They will be much useful for managing environmental issues targeting the global sustainable development goals. Therefore, relevant institutions can benefit from the symposium and the proceedings.

The Department has taken measures to strengthen the initiative and to make the effort to assure continuity of the program each year. Accordingly, the first environmental management undergraduate research symposium 2017 is the first step and will continue to be held each year. Student initiation and the staff support for the program is highly appreciated. Further, this venture would not come reality unless the appropriate encouragement and the support from the university leadership – The Head, Department of Environmental Management, Dean, Faculty of Social Sciences and Humanities the Vice-Chancellor of the University.

Dr. JMSB Jayasundara

MESSAGE FROM THE SYMPOSIUM COORDINATOR



It is my great pleasure to send this message to the proceedings of the first Environmental Management Undergraduate Research Symposium (EMRUS 2017). This conference will provide an important forum for undergraduates who are engaged in environmental related research under the theme of ‘Staging Young Researchers for Environmental Management’.

I wish to express my sincere gratitude regarding the strong and enthusiastic response we have received from the students across the universities by sending abstracts for this conference. I am very happy to note that we have received around 91 extended abstracts encompasses a wide-array of environment related research areas and selected 66 out of it, where we would be able opening up new thought to the discipline. I congratulate all of them.

However, this challenging task would not have been reached without the support of a number of well-wishers, all of whom would share the pride of the success of this important event.

I must specially thanks the Vice Chancellor of the University and the Dean, Faculty of Social Sciences and Humanities, the Head, Department of Environmental Management for their constant support and encouragement.

It is with great pleasure, I use this opportunity to offer my sincere thanks to the editorial board, members of the reviewing panels; their invaluable contribution is highly appreciated.

Finally, it is my duty to thank the Chief Editor Dr. J.M.S.B. Jayasundara, Senior Treasurer of the Sarasavi Nature Club Dr. P.S.K. Rajapakshe and all Club members, Conference Secretary Miss. H.U.K. Dilanjani, and all our academic, nonacademic staff, actively participated students of the Department of Environmental Management for their indefatigable effort to make this conference a success.

Thank you.

Mrs. MMSA Marasinghe

KEY NOTE ADDRESS: THE ROLE OF ENVIRONMENTAL MANAGEMENT IN CLIMATE CHANGE

Chairman, Central Environmental Authority of Sri Lanka



Introduction

Climate change is one of the biggest challenges faced by humans in modern history. The irony here is, mostly the results of human activities over the period of past century which determined contemporary climate changes. In general, Climate change through the aspect of global warming refers to the rise in average surface temperatures on Earth. It is caused primarily due to the human use of fossil fuels, which releases carbon dioxide and other adverse greenhouse gases into the atmosphere. The gases trap heat within the atmosphere, which can have a range of effects on ecosystems, including sea levels rising, adverse weather conditions and droughts that render difficulties in human life styles.

From the 1880's since when the industrial era began, the earth has been continuously warming up. It had mostly occurred during the last three and half decades. It was the first time in 2015 the global average temperature which was recorded 1 degree Celsius or more above compared to average temperature of 1880-1899. All the oceans have absorbed much of increased heat, with the top 700 meters of ocean showing a warming of 0.302 degrees Fahrenheit since 1969. Accordingly, the Global sea level rose about 17 centimetres during the last century. The rising rate in the last decade, however, is predicted to be doubled that of the last century. If this happens continuously, the lower lands of coastal area will be threatened in near future.

It is also experiencing more or inadequate rainfall, particularly during extreme weather conditions, leads to flooding or droughts and other damages an increase in the incidents and severity of climate changes threatening of habitats, day today life and homes, and also heat waves contribute to human deaths and other consequences.

Climate change experiences in Sri Lanka

As an island state, Sri Lanka should be ready to face climate change challenges. For example we have to face to an extreme weather condition of drought at present. The Rainfall rates from the Northeast monsoon were much weakened and most of the people do not have adequate water for their utilities and cultivations. Under these circumstances, water levels of all the reservoirs were gone down, electricity generation from hydropower has decreased and an inadequate supply of water for cultivation has resulted. Thus, hundreds of cultivated lands were abandoned. It is another fact that the saline water has been mixing-up with river water due to reduction of water level. Millions of people may face water shortage in future. The Meteorological Department has already predicted that the rainfall may not be available until end of April, 2017. Under these circumstances, how the people manage with their day to day activities?

Sri Lankan context

Sri Lanka has been adopting ‘Green policies’ to meet the challengers of the climate change. Some of the policies are listed under the ‘Harithalanka’ program and National Environmental Policy and strategies. There are: A). Clean air everywhere in the country; Shift towards cleaner fuel: It is expected to achieve 20% non-conventional renewable energy by 2020, Reduce vehicle emission and develop environmentally viable transport system. B) Saving the Fauna, Flora and Ecosystem, specially forest cover of the country; strengthening policy, legal and institutional framework for bio diversity conservation, increasing forest covers from 29% to 32% and preserve traditional knowledge and practices. C) Meeting the challengers of climate change; integrated solid waste management, Carbon foot print- Carbon reduction, Use of economically viable, renewable energy and installing of one million home solar power generation home system. D) Responsible use of the land resources; reduce land degradation in agriculture area, rehabilitate deteriorated lands and mitigation and adaptation to drought and E). Greening the industries; cleaner production industries, greening the supply change and establish eco-industry Park. In additions, establishing 10,000 Green Villages across the country and creating sustainable fishing are some important aspects of Green Policies in Sri Lanka.

Role of environment managers

Probably everybody have observed that ‘Green’ is everywhere at present, in terms of production, economy, politics, jobs, safety, fashions, buildings, foods, even in technology around the world. In fact, maintaining a simple life style with the efficient use of resources, apply 3R policy (Reduce, Reuse and Recycle; reduce the things which are not environmental friendly. Reuse the old materials and recycle materials can be used in green buildings) avoid air conditioning, use of renewable energy, use of bicycles and use of public transport systems, maintaining low carbon footprint and good governing all sectors are the major activities that the people follow to meet climate change challengers. Extensive use of green energy, green agriculture, green industries, green accounting, green cities and building, green transport, green jobs and green services are the possible solutions to meet the above mentioned challengers.

Environment managers have a great role to face the challenges of climate change. They can play different roles by educating people in regarding community awareness, environment planning, conducting research on adaptation, actions taken to decrease the carbon foot print and enhancing green concept etc.

Green education institutes

Educational institutions such as universities may contribute in green policies to meet the adverse impact of climate change. Some of these are the use of renewable energy, use of sustainable building materials, rainwater harvesting, establishing an integrated waste management system, keeping the environment clean and increase the tree density within the university, calculate per capita carbon foot print and take necessary measures to increase the carbon foot print and training more people on environmental management.

Conclusion

None can be escaped from the adverse impact of climate change if they don't apply or adopt scientific and suitable policy perspectives. It is an universal truth that the best way of avoiding adverse impact on climate change is to apply 'Green policies' to all aspects of human lives. It is simple and can be adopted by all. The Rajarata University can also adopt a 'green policy' as a model to other institutions established in the region. In addition they can produce more trained human resources/ environment managers to meet the challengers of adverse environment impacts in future in the country.

Prof. Lal Mervin Dharmasiri

ABOUT THE DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

The Department of Environmental Management was established in 2015 under umbrella of the Faculty of Social Sciences and Humanities. This is the only academic department in the university system in Sri Lanka where the university entrants from the Arts stream can learn environmental management and secure a specialized degree. The Department offers subjects for the general degree and a Special Degree in Environmental Management which includes course units with cutting edge knowledge in the subject.

It is important to note that within one year of the establishment of the Department, it was able to organize its first undergraduate research symposium. We keep high expectations of the Department in serving the country as leading expertise in Environmental Management in the country and out of the country. The Department is still in its infant age has launched such activities. The staff gaining their postgraduate qualifications and in future the Department will grow faster.

The Department's future is in line with developing the discipline as a professional – academic orientation rather than providing the knowledge. The Department staff already has started researching on such relevant areas as drought and the environment of the CKD. It is our expectation to grow the Department to an institution leading in research and development in the areas of regional relevance in order to develop global speciality in the field.



ABOUT THE ට්‍රාසවි NATURE CLUB

ට්‍රාසවි Nature Club was established as a subject society of Environmental Management with the leadership of the staff and students learning the subject in 2005. Our aim was to provide a platform for improving leadership for managing environmental issues out of the students following the subject. During last eleven years the students who held the executive positions of the club, at present serving the country in leading positions both in the state and private sector. Each year changing leading positions of the Club have initiated various activities related to addressing issues of environmental management starting from explorations, cleaning, restoration, and planting trees etc.

Organizing the first Undergraduate Symposium is another such initiative where the active membership gained vast experience of organizing scientific communication events. It is sure that those members of the Club who took leading part of the organization of the Symposium will definitely serve the country to address growing environmental concerns of the country in future. Their individual roles are mentioned under the organizing committees and we can assure that they have gained considerable training on all organizational issues.

It is also need to note that the staff members dedicated their efforts to keep continuing the work of the Club particularly when the experienced committee members leave the university and in organizing various activities. It is worthwhile to note that each year, new committee initiates at least one important activity such as organizing this Symposium. The Club always was able to maintain cordial relationship with the university community. It can be expected that the Club will continue its excellent contribution for which we all wish all the best.



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ACKNOWLEDGEMENT

The Organizing Committee of the First Environmental Undergraduate Research Symposium (EMURS-2017) tributes sincere thanks to:

- Professor Ranjith Wijewardena, the Vice Chancellor – Rajarata University of Sri Lanka for the leadership, being the patron and gracing the occasion as the Guest of Honour;
- Professor Lal Mervin Dharmasiri for sharing a vision for future actions in Environmental Management;
- Dr. CR Withanachchi, the Dean – Faculty of Social Sciences & Humanities for valuable contribution in numerous ways;
- The University management headed by the Registrar, the Bursar and their subordinators of the Rajarata University of Sri Lanka.
- All expert reviewers and session chairpersons for their dedication and commitment to review extended abstracts and contribution;
- All the members of the Advisory Board for valuable guidance;
- All members of the Faculty of Social Sciences & Humanities for support and approval;
- The well-wishing father of LD Nimalasiri for his donation;
- The Manager - The Bank of Ceylon, Mihintale Branch for co-sponsorship;
- The Manager – The Bank of Ceylon, Kebithigollewa Branch for co-sponsorship
- All presenters who visited us to share their research findings with us;
- All the support staff of the Faculty for their valuable contribution and
- All who have provided any support and has not been mentioned above.

PROGRAM: INAUGURAL CEREMONY

- | | | |
|-------------|---|---|
| 0830 – 0855 | - | Arrival & registration of guests |
| 0900 – 0905 | - | Lighting of the traditional oil lamp |
| 0905– 0910 | - | University anthem |
| 0910 – 0920 | - | Welcome speech by
Mrs. MMSA Marasinghe
Symposium Coordinator |
| 0920 – 0925 | - | Address by Mr. NSK Herath
Symposium Convener
Head- Department of Environmental Management |
| 0925 – 0930 | - | Launching the proceeding of the symposium |
| 0930 – 0935 | - | Address by Dr.Chandana R.Withanachchi
Dean- Faculty of Social Sciences & Humanities |
| 0935 – 1015 | - | Keynote address by Prof. Lal Mervin Dharmasiri
Chairman- Central Environmental Authority |
| 1015 – 1020 | - | Address by Prof. Ranjith Wijewardene
Vice Chancellor- Rajarata University of Sri Lanka |
| 1020 – 1025 | - | Vote of thank by Ms. H.U.K Dilanjani
Symposium Secretary |
| 1025– 1030 | - | National Anthem |
| 1030 – 1100 | - | Refreshments |

Analysis of environmental performance in hotels with and without environmental management systems

Extended Abstract

RMKSR Ranaweera¹

Background

Against a background of increasingly serious environmental deterioration and improving environmental regulations, businesses and industries are facing growing responsibility to manage their activities. Industrial activities are becoming an influential threat to the environment, has to be managed. However, most business organizations are motivating to manage their environmental impacts and improve sustainability in business. This research focuses on the problems businesses face in dealing with environment and identifies best practice for business using the ISO 14001 Environmental Management System (EMS) framework to manage the environmental aspects and impacts within a company, with special reference to hotels in the tourism industry.

The hotel industry keeps growing. Worldwide tourism represents 35% of the world's exports of services and over 70% in some developing countries (Zein, Wazner, Meylan, 2008). In Sri Lanka, Tourists' arrivals from 2009 to 2013 have increased emphatically. It is approximately from 400000 to 1250000. Average annual growth rate from 2005 to 2013 is 21%. (Tourism Development Authority, 2013). This growth directly accountable in environmental aspects because the whole population has to accommodate in hotels which come with unsustainable consumption practices endangering ecosystems and natural resources. 75% of environmental pollution caused by hotel industry was from over-consuming energy, water, and materials while operating business. So, hotel industry worldwide is currently getting more and more concerned about environmental issues (Chen 2008). Hence, hotel industry is unavoidable revenue to national economy there should be a compatible tool to balance its' incomes with the environmental costs. Otherwise profits will be

turned in to long term problems. To address such matters, an environmental management system is a proper way because, an EMS has the capacity to manage and deal with aspects that pressure the environment. It allows an organizational framework to control the impacts of activities, products or services on the Natural environment systematically and continually while helping organization to reduce unnecessary costs. This research has reviewed the level of EMS plans in selected hotels which controls environmental issues grow out of hotels under its' several departments. Selected hotels were in different levels in EMS plans or they were implementing several environmental performances without EMS plans to control their impacts. So, there is a comparative analysis in these performances which help to identify advantages and barriers for an EMS plan.

Objectives

The general objective of this study was to analyze environmental performance in tourist hotels with and without Environmental Management System in order to recognize advantages of having EMS in tourist institutions. As well as identifying the level of implementation of EMS in selected hotels, comparing performances of environmental activities of institutions, and identifying advantages and challenges in implementation of EMS to recommend potential practices of EMS for tourist hotel sector were the specific objectives of this research.

Methodology

Sample selection was according to their environmental performance levels (with and without EMS plans). Institutional review of selected tourists' hotels has done by primary and secondary data collection. Respectable officials in managerial level have been interviewed and employees from each department have given questionnaires to fill up initial Environmental Review (IER) form which was prepared under six modules.

Results

According to the comparative analysis done with the data collected from hotels with & without EMS plans, there is a performance variance. But despite

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being hotels without EMS plans they are following some steps of EMS such as planning, implementing, and measuring. But the environmental actions needed to be evaluated, reviewed and employed corrective actions for continuous improvement which are not implemented in hotels without EMS plans. The hotels with EMS plans also indicating a performance variance in their EMS because, they have different levels of competencies, accessibility to technology, human and financial resources and efficiency in working. Also the attitudes make the process more success. If the involved people are thoroughly committed to accomplish their responsibilities well, the process can be executed well. According to the results, hotels without EMS plans are resisting to apply EMS because of many reasons. Such as negative attitude on EMS, lack of human and financial resources, lack of technology and time consuming, too much of paper work, employee resistance. But majority of respondents stated that hotels have the financial capacity for implementing EMS and there is a need of environmental management. Therefore, better coordination and guidance is needed for more widely environmental management. Commitment and the whole environmental performance have a significant relationship which means, commitment influencing the environmental actions in the process and it decides the improvement or decline of the performance. According to the results, hotels with a high commitment levels have implemented their process effectively.

Conclusion

Individual assessment of environmental performance will help any institute to understand the barriers for EMS in their own property and so that they can formulate the most suitable and preferable implementation strategy. ISO 14001 can be incorporated with government support and guidance to gain more reliance in beneficiaries. Also the successful EMS implementing institutions can be appreciated with government assistance such as awarding. Government should begin laying out the necessary incentives and standards to move the industry in direction of applying EMS. It will

be a motivation to hotels that have applied an EMS and also the hotels that are planning to apply an EMS in their property.

Recommendations

Hotel industry as well as any kind of industry can be advised on advantages, motivations and capacities for EMS and launch a process considering country as a whole to apply EMS. If there is a common criterion to guide small scale industries for EMS and if they assist with a prior investments industries can be motivated for applying EMS in their private property escaping their barriers such as Banks can open special lines of credit to finance the for further improvements. EMS education is comparatively less than the other subject areas related to environment. Therefore incorporating EMS in education more widely can be a reason to improve the motivation on EMS present as well as in future. Mostly, EMS in industries are operated by maintenance engineers, they have combined responsibilities on engineering functions. Therefore, important steps in EMS can be avoided or missed out. Appointing an EMS manager will be mostly effective in EMS implementation and its success. ISO 14001 for Environmental Management Systems should get more popularity that it is a systematic process of managing environmental impacts in any kind of institute.

Keywords: Environmental Management System, Environmental Sustainability, Initial Environmental Review, Environmental Impacts, Environmental Performance.

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Effects of invasive plants: A case study in Bulankulama wewa in Mihintale

Extended Abstract

UHS De Silva¹, NSK Herath

Back ground

Conservation of the biodiversity is a major challenge of the world. Invasive alien species (IAS) are major part of this challenge. They may invade terrestrial or aquatic ecosystem. (Wijesundara., 2010) At present Sri Lanka has faced to aquatic IAS in terrible. They spread on tank and water reservoirs. Wawa is a main manmade water reserves and ancient civilization was based on tanks. Bulankulama is a main water resource in Mihintale area. Water of the Bulankulama Wawa is used by people for agricultural activities, fisheries and cultural activities. At present Wawa ecosystem and livelihood of Mihintale are suffering from aquatic IAS. Impacts of aquatic IAS are increasing day by day.

Objectives

The general objectives of the study were to identify the effect of aquatic IAS to Bulankulama Wawa and livelihood of villagers and to identify the proper mitigation methods for resolve the problems. Specific objectives were to identify what is the aquatic IAS, reason of spread of aquatic IAS, impact of aquatic IAS to protect sustainability of Wawa, solution to control, the barriers to minimize the aquatic IAS can be identified.

Methodology

Both primary and secondary data were used from collecting data from field surveys, interviews and questionnaires were used as a primary data. Newspapers, magazines, extended reports and internet were used to collect secondary data. Both qualitative and quantitative data were used for data analysis. Map analysis, correlations were used as a data analysis method. Interviewed 50 villagers in Mihintale

including Welwidane, members of agrarian society, agrarian society, fishermen, some peoples and students.

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Result and findings

According to field survey researcher faced both negative and positive impact of irrigation, livelihood and eco-system. Lot of aggressive plants have spreaded on Wawa. Water lily, (*Nemphaea pubescens*), blue manel (*Numphhea stellate*), Nelum (*Nelumbo hucitera*) salvinia (*salvinia molesta*), water hyacinth (*Enchornia crassipes*) Kankun (*Impomoea aquatica*), ikiliya (*Asenthus illicitolia*) diya nidikumba (*Neputunia oleracea*) are the common IAS in Bulankulama Wawa.

Sri Lankan government establishes number of rules and regulation for control IAS. Water hyacinth act in 1909, 1988/99 ministry of forestry and environment (MFE) got to its notice the spread of *mimosa pigra*, *parthenium hostroporus* and alligator seed in Sri Lanka. MFE was organized 1st awareness work shop on alien invasive species in Colombo. (Marambe, 2011). Most of younger generation hadn't good knowledge about wawa and some of them don't go to visit Wawa.

Cultivate 32acrs using water of wawa in twice in year (yala and maha) 46% people protect water from evaporation. Fishermen said some of their equipment can't handle properly due to aquatic IAS. 19% percent use water for fishing. Some of fishermen said aquatic IAS like floating leaves plants are helped to increase fish production. As well as some people use aquatic IAS as a medicine {Ikiliya (*Asenthus illicitolia*) Nelum (*Nelumbo hucitera*)}

Some plants disturb irrigation systems like water hyacinth and hydrilla.

Some plants create a thick layer on water and that block the sun rays. That cause to eutrophication and change the COD and BOD level in water.

Conclusion and recommendation

As a dry zone area wawa is a most important thing. That can stock high water capacity. Nevertheless in present Bulankulama wawa is going to dead due to aquatic IAS. It is needed to get an action for controlling aquatic IAS using government officers and villagers. There are three way to control aquatic IAS. Chemical control, physical control, biological control Awareness of the villagers should be improved about the impact of aquatic IAS and also should be given the proper knowledge about maintenance and importance of wawa. After that must start again cultural programs like Mutti mangalya, Kiri itirum Mangalya. That helps to

protect Wawa. Bulankulama Wawa has rich with bio diversity and Rajarata University must pay attention about sustainability of this wewa as one of the responsible institutios of the conty.

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Coastal pollution in Chilaw beach in Sri Lanka

Extended Abstract

DMU Sripali¹

Background

The coastal is a very special environment in that it is where the land, sea, and atmosphere meet. Each of these contributes to the working of the coast, making coast very interesting, and yet a challenging subject to study. In present day, one of the critical phenomena facing mankind is coastal pollution. It can effect to the both social and economic life (Haslett, 2000). Coastal pollution occurs when harmful, or potentially harmful, effects result from the entry into the ocean of chemicals, particles, industrial, agricultural and residential waste, noise, or the spread of invasive organisms. The island of Sri Lanka has a coastline over 1700 kilometres long, more than kilometres to every 40 square kilometres of its land surface. Coasts are generally losing and pronounced indentations are few. Coastal landscapes exhibit considerable diversity. Various sources of the pollution of marine environment were identified and the causes for the same are understood. Many of the pollutants that are let into the sea are directly or indirectly by human activities. Some of these substances are biodegradable, while some are not. Several laws and policies have been taken in preventing marine pollution at the national and international levels. Simulation of oil spills has been done by developing models in some parts of the world. The pollution of the shore is increasing at an alarming rate and to address this problem of pollution in the oceans is a difficult task, and a variety of approaches are urgently required (Dwarakish, 2014). In this paper, the definition of coastal pollution, causes of coastal pollution, its impacts and preventive measures are discussed.

Objectives

Chilaw coast is one of the important coastal water bodies in Sri Lanka which has greater impact on country's economy and environmental value. In this study, the concept of “coastal pollution” is mainly used. Furthermore to study the importance of marine ecosystem, to identify impacts of coastal

pollution, to study causes of coastal pollution and to examine the measure to prevent of coastal pollution.

Methodology

Required data and information related to coastal pollution have been collected from the primary and secondary data sources. Sampling method has been used to collect primary data. Thirty samples have been collected by questionnaire survey. Secondary data has been collected from Marine Environmental Protection Authority report leaflet, newspapers and published books.

Result

Today one of the most dangerous phenomena facing mankind is that coastal pollution. Waste became a major threat for the lagoon and coastal area. Inadequate land for waste dumping and the negligence of the people are the major cause of this situation. Nowadays, the major problem arising in Chilaw area is the garbage problem. There is much garbage in Kurusapaduwa village. There is no particular place to waste garbage due to this reason people are completed to put garbage on the beach side. It causes to the lagoon and the beach people who live in this area have to face this problem. To collect data for this section, the researcher has used a questionnaire for 30 people of selected random sample. Especially, it's has paid attention to disposal methods of home waste. Such as Sea, Lagoon, Tractor municipal, Put into a garbage pit, Pig food and other. It indicates that the situation of lagoon source is very high level of disposal methods of home waste.

Conclusion and Recommendation

Coastal and marine pollution in Sri Lanka has been increasing over the years. The major sources of coastal pollution in Sri Lanka are mostly land based, mainly from development and human activities outside the coastal zone. According to result of the case study has shown that the pollution causes in Chilaw coast have serious negative impact on the human life and coast. There are a lot of bad side effects for people and their functions because of polluting the coastal area.

Defensive planning, consisting of restrictions, should be complemented by positive planning indicating where activities may be located provided that due consideration is given to environmental

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protection. The siting of industrial activities which have to be located in coastal areas should be such as to guarantee a maximum of environmental protection. Free access by the public to the sea front in areas of tourist interest should be ensured.

Keywords: Coastal pollution, lagoon, beach area, environment

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An assessment of environmental and socio-economic impacts of metal quarries in Anuradhapura district: A case study of Medawachchiya DS Division

Extended Abstract

RMS Rathnayaka¹

Background

Economic development is one of the main objectives of the developed and developing nations in worldwide. Raw materials are essential to achieve this objective. Stone mining is viewed as one of the important economic activities which have the potential of contributing to the development of economies (James, 1999). At the same time, the environmental and socio-economic impacts of stone mining on surrounding communities have been major concerns to governments, the general public and stakeholder organizations as well as individuals (Rosa and Lyon, 1997). While the contributions of stone mining activities to economic development of Sri Lanka is well acknowledged, others contend that the gains from the stone mining sector to the economy is achieved at significant environmental, health and social costs to the country.

Objectives

The researcher mainly focused on assessing the perceptions of the people who are engaging in stone mining and other affected parties of stone mining. The main goal here was to make suggestions to reduce environmental impacts of stone mining, identify the current status of environmental management in stone mining quarries in the area, to review the existing legal provision in relation to metal mining and examine the responsibility and roles of government institutions for reducing environmental impacts, level of environmental literacy among the community of the research area were the specific objectives of this research.

Methodology

This study has been conducted in methodology that it completes the requirements of examining the effects of stone mining including environmental, social and economic impacts in Medawachchiya

DS division which represent by researcher for purpose of conceptualizing the study. In this study, five GN divisions are selected to collect the primary data. The primary data about the environmental literacy and other environmental variables were collected by using questionnaire, field observation and interviews.

Results

Findings of the study highlighted that stone was mined most from environmental sensitive areas in Medawachchiyan DS division. Stone Mining is used for economic development - to construct durable, modern structures, employment creation and revenue collection - but removal of stones leads to acceleration of the environmental degradation. Water, air and noise pollution, waste accumulation and land degradation are considerable environmental problems arising from stone quarries in the selected sites. Stones are extracted from open quarries creating uncovered deep pits, which cause accidental damages to humans and animals. Erosion and environmental degradation occur due to continuous mining, which was confirmed by respondent's perception and experiences assessment. Miners dispose waste on open areas causing land pollution. Dust and noise pollution from tipper trucks and machines are disturbed for community life style in the area.

Conclusion and Recommendation

According to the findings of this study, stone mining is one of the major threats to environment in the dry zone of Sri Lanka. In the light of the present study, it is required an integrated approach to manage the main problems caused by stone mining are the destruction of the ecosystem. Socioeconomic and environmental consequences are stressed. It is essential to encourage technical and scientific knowledge transfer to the authorities responsible for public resources. It is also needed the development and application of innovative methodologies in a faster and precisely. People's perception about natural resources consumption and its environmental and socio- economic effects must be improved with education and training and through awareness programs.

Keywords: Economic development, metal quarries, socio-economic impacts

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Exploring the new approach for assessing spatial variation of household capacity for adaptation to increasing drought in the dry zone of Sri Lanka

Extended Abstract

HMCHB Herath¹, JMSB Jayasundara

Background

This research proposes a new approach for assessing spatial variation of household capacity for adaptation to increasing drought in the village tank eco-systems of the dry zone of Sri Lanka. Drought is commonly defined as a deficiency of precipitation from expected amount that extends over a season or longer and results in a shortage of water that is insufficient to meet the demands of human activities and the environment (Hayes, 2012). Drought differs from many other natural hazards such as flood, hurricanes, and tornadoes because it's slowly moving natural hazard. It affects to a wider region throughout a long period. It is called 'creeping' hazard. There are various methods for assessing the impacts of drought; however, some of them are not possible to apply at the ground level or not much useful in terms of assessing the drought. This paper attempted to find out an appropriate methodology for assessing spatial variation of household capacity for adaptation to increasing drought in the village tank eco-systems of the dry zone of Sri Lanka with the application of five capital approaches. Especially, drought management based on household decisions and in turn, household decisions are based on their capacity for adaptation for the drought. Decisions are taken by individual (Smith, 1996). Individual capacity is a very important aspect of drought management. This research propose methodology for assessing individual capacity for assessing spatial variation of household capacity for adaptation to increasing drought in the dry zone of Sri Lanka

Objective

The general objective of this study is to find out the suitable approach for assessing spatial variation of household capacity for adaptation to increasing drought in the village tank eco-systems of the dry zone of Sri Lanka. This paper examines the various

droughts assessing methods and proposes most suitable methodology for drought adaptation.

Methodology

This study was conducted analyzing literature pertaining to drought assessment methods. This paper examines the various methods for measuring household capacity. In this study examine the different approaches and discuss how the FCA is more appropriate to assessing spatial variation of household capacity for adaptation to increasing drought in the dry zone of Sri Lanka. When it compares with other approaches five capital approaches according to the objective and analysis if it is used find what the important drought assessing method is. And also compare various droughts assessing method for drought management related to study aim. And according to the usability for study purpose there are many studies available in developed country according to the five capital approach but developing country there aren't used drought assessment method in developing tropical country Study area

Result

There are some various methods available to assess the drought such as Vulnerability Assessment Method (VAM), Reconnaissance Drought Index (RDI), fuzzy rule-based approach, Standardizes Precipitation Index(SPI). Most of the methods do not interest household capacity. The VAM method depends on primary variable exposure, sensitivity, and adaptive capacity. Exposure is based on frequency and severity of drought. Sensitivity is the susceptibility of the water user to the effects of the drought. Adaptive capacity is the ability of a water user to manage or reduce adverse effects of a drought, through actions taken before, during, or after the drought. Exposure and sensitivity determine the potential impact (Fontaine, 2007). Reconnaissance Drought Index, RDI, may be calculated by the following expressions (George Tsakiris, May 2007). This method not interests to assessing household capacity this five capital approach interest household capacity like a bottom-up approach. In this methodology cover every side of householders that's why this methodology suitable for assessing spatial variation of household capacity for adaptation to increasing drought in the village tank eco-systems of the dry zone of Sri Lanka.

Conclusion

There are various methods for assessing drought but those are not interesting to find out household

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capacity. This five capital approach most suitable for assessing to drought. Five capital approaches covered every aspect of the households.

Keywords: Five capitals, bottom up, creeping disaster, VAM method, household

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The perception of drought among households living in small wewa ecosystem in North Central Province

Extended Abstract

YMDN Yapa¹

Background

Drought is the consequence of lack of rainfall over an expected period of time. Drought means various to various people depending on their specific interest. Drought is different from the rapid-onset environmental hazards. It is called a ‘creeping’ hazard because droughts develop slowly and have a pro-longed existence, sometimes over several years. (Smith, 2004). According to Keith Smith 2004, drought is the most important environmental hazard in semi-arid regions for two reasons. First, a low mean annual rainfall is associated with high variability. Second the duration of drought is longer in the drier lands. The meaning of drought can be changed from person to person, country to country or region to region. Mainly four types of drought can be identified as meteorological, hydrological, agricultural and famine or socio economic drought. Natural and human effects are causing drought. Perceptions vary from person to person. Different people perceive different things about the same situation. Perception is the organization, identification, and interpretation of sensory information order to represent and understand the environment.

A small wewa system is a network of interconnected manmade reservoir built in the drought prone areas in order to provide water all year round. North Central Province (NCP) of Sri Lanka has a high-risk of drought because NCP is wholly within the Dry Zone and main livelihood of area is agriculture (Ministry of Environment and Natural Resources, 2007). Though there are ancient cascade systems in the Dry Zone, people in the area are suffering from lack of water for agriculture and safe water for drinking and other domestic purposes.

Drought is different from other hazards because it is not a rapid onset hazard and there is no direct loss of lives due to drought but it may cause vast impacts to the society creating socio economic and environmental problems. Due to the secondary data can be identified global perception of drought.

When using the open ended questionnaire survey data researcher can be assessed the perception of drought among households in small wewa ecosystem in North Central Province.

Objectives

The overall aim of the study was to assess the perception of drought among households living in small wewa ecosystem in North Central Province. Specific objectives of this research were; to understand about drought perception in the world through second resources, understand nature of drought perception in the North Central Province and identify spatial variation of drought perception within the province.

Methodology

Both of primary and secondary data were used for this study. Primary data collected by using open ended questionnaire survey. 540 household surveys used random sample in eight Divisional Secretariat Divisions. There are Galenbidunuwewa, Padaviya, Horowpothana, Palugaswewa, Kebithigollewa, Madawachchiya, Mahavilachchiya. Data were analyzed qualitatively and quantitatively. As secondary data books, magazines, newspaper articles leaflets and internet were used. Graphs, charts and tables in Excel were used to analysis the data.

Results

Small wewa systems in Galenbindunuwewa and Kebithigollewa divisions show the lowest level of drought hazard. Small wewa system in Mahavilachchiya division shows the highest level of drought. 60% of people in the North Central Province identify drought due to lack of expected rainfall. 40% of people in the North Central Province identify drought is aridity.

Conclusion

Highest level of drought hazard show Mahavilachchiya and low level of drought hazard show Galenbidunuwewa and Kebithigollewa. Most of people identify drought due to lack of expected rainfall in North Central Province. Drought effected to households in small wewa ecosystem in North Central Province.

Recommendation

This open ended questioner’s survey data shows perception of drought among households in small wewa ecosystem in North Central Province. And

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also the researcher basically introduces most appropriate adaptation methods through the human perception about the drought in NCP.

Key Words: Drought, Small wewa ecosystem, Perception

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A study of social & economic impacts of Chronic Kidney Disease in Mihintale Divisional Secretariat Division

Extended Abstract

DPGAD Sumanathissa¹

Background

A high prevalence of patients with Chronic Kidney Disease of unknown a etiology (CKDu) was noted from the North Central Province of Sri Lanka since mid-90s, (Wanigasuriya, 2012). The social and economic impacts of the disease includes sudden disruption of livelihood following the onset of disease in typically the chief bread winner of the household, moral panic concerning what causes the epidemic, disruption of children's education, stigma encountered by the patients and their families, and lack of support mechanisms for the families affected (Mendis, 2012). This is a burning problem in North Central Province including Mihintale DS Division. The illness has changed resource allocation and consumption patterns within the family unit and influenced the setting of priorities, maintenance of social relationships and participation in community activities. In coping with the high cost of medical treatment, sudden disruption of their livelihoods and increased loss of renal functions, the affected families resort to multiple coping strategies such as mortgaging and selling of assets, soliciting of funds and kidney donations from the public as renal failures reach a crisis point (Bandarage, 2013). In order to minimize the impacts of the disease, effective interventions are needed for prevention of the disease including early diagnosis, raising public awareness, promoting patient activism and legal measures against aggressive marketing of and inappropriate use of agrochemicals.

Objectives

The aim in this research was to examine social and economic impact of Chronic Kidney Disease of unknown etiology. Specific objectives were to find out the magnitude of disease spread on GN basis, to study socio - economic impacts of the CKDu, to examine the reasons for high incidence of diseases

in certain DS Divisions (sources of drinking water, use of agro-chemicals, day today consumption of drinking water etc.)

Methodology

This research used both primary and secondary data. The required primary data were collected through household survey based on the structured questionnaire, field observation, etc. The samples of 40 respondents including patients were selected from 12 GN divisions. The secondary data was collected from different sources such as Divisional Secretariat- Mihintale, reports, books, articles and internet was used.

Results

Based on the secondary data available, it was found that there were 247 CKDu patients in Mihintale DS Division (Ranasinghe, 2013). Detailed analysis further revealed that 161 patients receiving Rs. 3000.00 per month from the government as a compensation to cover up the cost of medical expenditures. Education of children is badly affected and the stigma associated with the disease contributes to social and emotional cost. Most affected were men (63%) aged between 30 and 60 years, who worked as farmers and 2 infant patients were also reported in Mihintale DS division. This situation creates the huge financial burden for the patients and the families. Researcher found that the direct costs of clinical visit was around Rs 1000.00 per visit and indirect cost was around Rs.2500.00 per visit.

Conclusion and Recommendations

Chronic Kidney Disease (CKDu) emerged in the early 1990s, when hundreds of people in Sri Lanka's Dry Zone – heartland of its farming – developed kidney failure without having the common causative factors of diabetes or high blood pressure. Most affected were men aged between 30 and 60 years, who worked as farmers. Therefore, researcher, suggest public awareness programs, promoting patient activism, providing clean drinking water for rural communities, health promotion program, etc.

Keywords: kidney disease, unknown etiology, economic impacts, social impacts.

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Microplastic pollution in coastal water and beaches in southern Sri Lanka

Extended Abstract

JB Koongolla¹

Background

Plastic pollution has become a global environmental issue as plastic debris has reached and is found in all oceans of the world with adverse impacts on marine biota, biodiversity as well as human health (Thevenon, 2014). At present, Micro plastics in marine environment are considered as an emerging global environmental challenge for our society. Micro plastics are a key anthropogenic threat to the global oceanic ecosystems. There is a wide variety of particle sizes of plastics that are present in the environment. Micro plastics are defined as the plastic particles in the size range of 1 nm (Gesamp, 2015). It produces a wide variety of negative environmental, safety, economic, health, and cultural impacts.

Objectives

Microplastics pollution is a critical issue and it represents an unquantified threat to the marine environment, especially in southern coastal area of Sri Lanka. This study presents a baseline study on microplastics in coastal water and beaches in the southern coastal area in Sri Lanka. The objective of this study is to identify the presence of microplastics; to assess, physical classification of microplastics and to morphological characteristics quantification of microplastics to test spatial variations along the coastal belt.

Methodology

This study was conducted at ten sites along the Southern coastal belt. Sampling was carried out in the sand by serving, water using plankton nets, and grab samples of bottom sediments. Micro plastics abundance was obtained as counts and weights in both beaches and waters. Particles were

characterized by size and morphology using visual identification.

Results

According to this research, there are significant amount of microplastics along Sri Lankan southern coastal environment and it confirms the presence of micro plastics in the country. Coastal beaches show a mean abundance of 1.015 g/m² and 69.46 items per m² of micro plastics with a dominant size range of 3.5 to 4.0 mm, while water samples averaged 0.008 g/m³ and 6.79 items per/m³ Morphological characteristics provide a more detailed account as fragments are the dominant form type of micro plastics collected.

Conclusion and recommendation

The highest abundance of microplastics was typically associated with coastal beach sand texture than the surface waters at a given location. Furthermore, a strong relationship was observed between weight and count abundance as both parameters used to determine the spatial distribution of micro plastics more detailed studies on the presence and the influence of micro plastics pollution in the marine environment have to be conducted covering the most critical beaches of the country. Pollution prevention programs should focus to consider sea-based sources of microplastics, and sea-based issues, such as dumping of solid wastes and wastewater at sea, to prevent microplastics from entering the ecosystem in unprecedented bulks. Therefore, policymakers, decision-makers and environment managers, as well as the general public, have to be enlightened to cope up with this emerging threat. Therefore, a well-planned awareness program has to be implemented at the first step in order to eliminate the root causes of microplastics while educating them to cope up with the present threat of microplastics.

Keywords: Microplastics, Plastics, pollution, Marine environment, abundance

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Study of strategies for solid waste management: A case study in Narammala urban area

Extended Abstract

DBMP Punchihewa²

Background

There are various kinds of environmental problems in our small island. Waste Management is a global issue which calls for maximum attention. Municipal Solid Waste Management is one of the most popular environmental problems facing by Sri Lankans. Solid waste management is to manage the society's waste in a manner that meets public health and environmental concerns and the public's desire to reuse and recycle waste material (Pugh, 1999). Industrialization, increasing things which people use, complex of life style cause to increase amount and category of waste. Lack of organized systems on waste collection, waste transport, intermediate treatment and suitable waste disposal have been contributing to aggravate the solid waste problem in the country (Resources, 2014). The present hazard waste disposal practices have created many environmental problems and numerous nuisances on general public. Narammala is the one of urban areas which is suffering from the solid waste management problem.

Objectives

All the urban areas in Sri Lanka have faced serious problems of societal environmental hazards. It is good to find out what are the hazards and suggest ways of reducing, above hazards, and also this study is very useful for the future researchers. After this research people can practice the solid waste management strategy and they can control their unnecessary habits. On the other hand, they can use suitable health to prevent the diseases related to the solid waste. The overall aim of the study was to examine the existing solid waste management strategy & propose the more effective strategies for Narammala urban area. Specific objectives of this research were to identify the existing management system, to identify the sources of solid waste, to identify the industries & businessmen opinions, to

introduce proper waste management methods for Narammala urban area and to identify possibility to apply solid waste management strategies for Narammala urban area.

Methodology

Narammala area situated in Kurunegala district of North Western Province was selected to this research. There are about 57,508 of people living in 54 GN divisions and 99.68 sq in this town and their major livelihoods are practicing business and working as government officers. This town has 800 business men. Both of primary and secondary data were used for this study. Primary data collected by field observation, using questionnaire and participatory observation. As secondary data books, magazines, news paper articles leaflets and internet were used. SPSS was used to analysis the data using qualitative and quantitative methods. The data were presented by graphs, charts and tables.

Results

Most of the people dispose their waste inside of the shops. There are 16,171 houses in Narammala urban area. They dispose 20 tons wastes per day. Pradeshiya Sabha collects wastes about 10 tons per day. There are 6.5 tons organic and 3.5 tons non organic wastes. There is a compost site in Oliyadeniya Watte. Few of responders use composting method to dispose their waste. Polythene and plastics collection were identified as very high. Unpleasant environment was the major impact on solid waste problem in Narammala urban area. Huge amount of waste was issued by shops specially hotels. Perception of people was in moderate level considered about service of Pradeshiya Sabha. Many people suggested that the most suitable method for waste management is composting.

Conclusion and Recommendations

These are some of recommendations for solid waste problem in Narammala urban area. Launch awareness programmes in pre-schools, primary and secondary schools in Narammala urban area. Introducing separate colour code dustbin system. Adopting Polluter Pay Principle/ pay fine from polluter. Organizing 'green shop competition' annually and giving awards and prizes for the

winners. Implementing awareness programmes for shop owners. Creating a programme supporting of Pradeshiya Sabha. Ex; every shop owner should pay 50Rs per month and take environmental

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friendly waste disposal bags and put their waste separate into them and handover to the Pradeshiya Sabha again. Through this process Pradeshiya Sabha can establish Green Fund and this can be used for awareness programmes in schools and public. Creating awareness programmes for changing the attitudes of people.

Key words: Composting, polluter pay principal, awareness,

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Potentials for managing waste papers: A case study of Rajarata University of Sri Lanka

Extended Abstract

BND Dissanayaka¹, PSK Rajapakshe

Background

The paper is traditionally identified with reading and writing, communications has now been replaced by packaging as the single largest category of paper use 41% of all paper used (PPI, 1995). After using a paper becomes a waste in short. Simply, discarded papers are called as a paper waste. Around the worldwide, we use one million tons of paper every day (WWF, 2016). Raw materials of the paper pulps are majorly from woods. So today paper wastes are increasing gradually and it indirectly affects the environment. The second cause of paper waste is the misuse of technology. When computers first started coming out, it was theorized that society would move towards a paperless world. However, this theory did not prove to be true (Randall, 2005).

However Rajarata University is still utilizing some of the traditional strategies like written papers documents, questions, answer papers, and assignments. As a result, a huge amount of papers are collected for waste, and burning is frequently used way of disposing of these papers. In fact, burning causes many invisible environment issues since papers are majorly made of wood. Therefore, managing papers mean saving trees. Apart from that, it is a threat to university's scenic beauty. Moreover, our day to day activities also adds paper waste to the university. Recycling 1 ton of paper saves around 682.5 gallons of oil, 26,500 liters of water and trees. Therefore, it is advisable to manage paper waste in order to save natural resources.

Objectives

We live today in an electronic age, people are starting to consider going paperless. Paper production involves cutting down trees. Therefore, wasting paper means destroying the natural resources. The main intention of this study is to identify the harmful effects of paper waste and to

propose measures to reduce paper waste of Faculty of Social Sciences and Humanities. Moreover, this study involves counting the number of student's assignments and answer papers, calculating the weight of assignment paper waste in the faculty and identifying which resources can be protected by the paper waste management. Furthermore, this research will be extended to a comparative study among the departments of the faculty. It is also intended to identify benefits of reducing paper waste. The final objective is to make others aware about harmful effects of paper waste and encourage them to explore "How to go green".

Methodology

Data were collected via both primary and secondary data collection methods. The secondary data collection methods were utilized in collecting information from the selected websites on the internet, and the primary data collection method includes questionnaires, interviews, and a field survey. The sample group of the present study was comprised of 40 students who were randomly selected from the faculty of Social Sciences and Humanities. These participants were chosen to represent the undergraduates who are currently following both general and specialized degrees in all five streams available in the faculty aforementioned and covered four batches. Moreover, interviews were conducted to collect data from both academic and non-academic staffs. Finally, the data collected were calculated by the functions of SPSS.

Results

According to the study, students majorly use A4 sheets for their assignments. The weight of one A4 sheet is 80gsm (similar for 5grams). The results also indicate that 8928.8kg of paper waste which is 1785760 papers is removed yearly from the faculty. The largest number of paper waste is committed by the first year students which are 3326kg. Moreover recycling 54kg of newspapers can save one tree.(Government of Canada, n.d.). Recycling one-year assignment waste in the faculty of Social Sciences and Humanities can save 167 trees. As it was estimated, 10 liters of water is needed to make one A4 paper and thus 324 liters of water are used to make 1kg of papers. Therefore, managing this paper waste can save 178576000 liters of water. In addition to that one tree produces enough oxygen for 3 people for their whole life. Therefore, when we recycle the annual assignment paper waste in our faculty, can help to save more than 55 lives.

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Conclusion and Recommendations

Paper waste is playing a vital role today. As a suggestion for aforementioned faculty can introduce for Valachchena paper recycling center for recycling papers. They pay Rs.4.00 per 1kg. Hence, faculty can earn nearly Rs.35715.20 annually except environmental benefits. Especially, if it is necessary to print make sure print on both sides. Submit the assignments via the e-mail is cost-effective and solution for allocates the large space for paper based assignments. Universities have a serious problem about the confidentiality of their document. So they destroy of the documents. However, a paper shredder is a machine can shred papers. So it solves the problem of disposal of confidential of environmental problems instead of burying, which creates in today wasteing and unnecessary usage papers make key damage to the environment. However, if we manage properly, can promote the 'GREEN CONCEPT' through the paperless path.

Keywords: paper waste, green concept, faculty, cost effective, environmental issues

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Environmental and socio- economic impacts of solid waste disposal practices: A case study from Gohagoda dumping site

Extended Abstract

GVNN Gurudeniya¹

Background

Waste has been a major environmental issue everywhere since the industrial revolution. Along with the waste from home, school and other public places, there are waste from hospitals, industries, farms and other sources. Disposal of solid waste is a major environmental problem in Sri Lanka at present and has become a national issue (Bandara and Hettiaratchi, 2010). Municipal solid waste management has brought out a severe attention due to the problems caused to health and environment. Growth of industries, urbanization, and increase in population has added solid waste problems to the country over the past few years (Herath *et al*, 2015). Kandy is the capital of central province in Sri Lanka. But the daily solid waste collection within the city limits is around 100 tons. Basically it belongs to the Wet Zone (Wijerathna *et al*, 2012). Gohagoda dump site is one of the municipal solid waste disposal sites. It has decades of waste collected from Kandy district. Open dumping of Municipal Solid Waste is one of the most important environmental problems in Sri Lanka. This study examines the Environmental and socio- economic impacts.

Objectives

The general objective of this research was to study of the environmental and socio economic impacts of waste disposal practices in Gohagoda dumping site. Also the specific objectives of this study were to study the waste disposal practices in Gohagoda dump site, to identify the types of waste in Gohagoda dump site, to analyze the people's perceptions about the Gohagoda dump site and propose the waste management strategies for Gohagoda dump site.

Methodology

30 families in Gohagoda GN division were selected randomly for questionnaire survey as the sample.

Questionnaire, Field observation, Informal and Formal interviews were used to obtain primary data and books, reports, maps, research papers used to collect secondary data and used graph, charts and maps as data presentation method.

Results

Kandy does not have a proper solid waste disposal system thus collected solid wastes are dumped on to the Gohagoda dumping ground. The Gohagoda solid waste dump Site adjoins 'Mahaweli Ganga'. There is no good leachate treatment process that leachate directly going down to Mahaweli River. Landfill leachate generation is a serious environmental problem associated with open dumpsite. Landfill leachate is highly contaminated with different types of toxins. Another issue is waste transportation. Waste fall of open vehicles and not enough workers direct waste contact can cause health issues to workers. They should be provided with uniforms and protective clothing. There are several types of waste such as polythene, plastics, paper, glasses etc. The polythene and empty tins become the feeding ground of mosquitoes and Dengue like diseases are the result of that. Some animals eat polythene and can die and the bad smell of their carcass has made the environment spiny. Also it badly affects the scenic beauty of the area.

Conclusion and recommendation

In Gohagoda landfill site, there is no proper waste management system. It has no good waste management process implemented successfully. According to the survey, government should promote good waste management process and good waste water purification plants. Various types of awareness programs, resettlement program can be implemented for affected people in the area. Finally, waste management process of Kandy Municipal Council and public awareness programs must be improved successfully. Thus it'll help to create beautiful and healthy city and also can rehabilitate Gohagoda landfill site as good and healthy site.

Key Words: Solid, Waste Management, Pollution, Open Dumping, leachate

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Public attitudes towards improper waste dumping sites: A special reference from Ambuluwawa

Extended Abstract

KWMP Senadheera¹, PSK Rajapakshe

Background

The solid waste is usually defined as any garbage, refused sludge, from waste treatment plants, water supply treatment plants, or air pollution control facility and other materials, including solid, liquid, semisolid, contained gaseous resulting from industrials, commercials, mining and agricultural operations from community activities.(Moeller, 2005). The solid waste has become a serious problem. It is currently a rigorous problem for the Sri Lankan municipalities. Not only the urban areas, the rural areas also started to suffer from this rapidly emerging problem which is causing so many problems to the society, economy and for many other areas. (Wijerathna, 2012). Ambuluwawa waste dumping site is maintaining by Gampola Municipal Council.

Objectives

Most impacts of solid waste dumping sites affects nearby residents, therefore, it is important to study on public attitudes (nearby residents) towards improper solid waste dumping in Ambuluwawa waste dumping site. As specific objectives of the research, study on used measures to the establishment of this waste dumping site in this location, study on how people interact with government and relevant parties, to examine the way nearby residents are thinking to take solution for this problem.

Methodology

This study was carried out in improper solid waste dumping site in Ambuluwawa village in Central Province in Sri Lanka maintained by the Gampola Municipal Council. According to this research, the population was a pool of people in Ambuluwawa villages and villages around “MahaOya”. The researcher has used random sampling method in order to carry out the household survey. 30

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questionnaires are used to assess public knowledge, attitudes, awareness and practices towards the solid waste problem. Primary and secondary data are considered and all collected data are analyzed by using the Statistical Package for Social Sciences (SPSS) and Excel.

Results

The researcher has found some important information about public attitudes towards waste dumping sites. According to human perspectives, the environment has seriously polluted. It measured by air quality, water quality, public health, food and drinking water, aesthetic beauty. It is researched about public attitudes towards some proposed solutions, pay some tax to remove this dumping site, changing living place, receiving some compensation. More than 15% of people was willing to change living place and about 45% of people prefer to pay tax to Municipal Council to remove the dumping site and more than 75% of people accept to have some compensation for the negative impacts created by the improper waste dumping site.

Conclusion & Recommendations

Public awareness about the impact of solid waste dumping sites is low. People take reactions against solid waste dumping sites by forcing to remove it, but most poor people may accept to bear that negative impacts for receiving compensations. The recommendations are, to aware people about conserving the environment without a high amount of waste production and change human attitudes. Control waste generation by law, separate waste by using separate dustbin system, establish proper landfill site in a lowland area and establish waste management plant such as waste to energy.

Keywords: Municipal solid waste, improper dumping site, public attitudes, quality, Ambuluwawa,

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Environmental and health impacts of solid waste disposal practices: A case study from Theliialla dumping site

Extended Abstract

RMMN Ranasinghe¹

Background

Solid waste is a growing problem not only Sri Lanka as well as in developed and developing the world today. In ancient civilization human necessities were simple within their day to day activities, they release them into the natural environment. Any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. What this basically means is that anything that we produce and does not reuse call as solid waste. Something can be become waste when it is no longer useful to the owner or it is used and fails to fulfill its purpose (Gourlay, 1992). Solid waste according to Malombe (1993), irregular services rendered to producers of refuse by municipal councils compels them to find ways of disposing of refuse. One person generate solid waste of the municipal councils around 0.65 – 0.85 in Sri Lanka (kg/day/person), (UNEP 2011).

According to this study the solid waste management strategy based on Theliialla open dumping site situated in Theliialla GS division in Warakapala secretariat division which is one of the open dumping sites of Sri Lanka. The pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove harmful compounds.

Objectives

To highlight the major solid waste management issues in the towns of in Sri Lanka, considering the above, this study is designed with the prime objectives of identifying the environmental problems of the Municipal Solid Waste dumping site and to recommend effective managerial measures to safeguard its environmental health in a

sustainable manner. To study of environment and human health impacts associated with solid waste disposal practices. On the other hand to study about solid waste and solid waste disposal, to identify the major impacts to environment and human health and to propose prevention and mitigation methods to the impacts and make the waste management plan

Methodology

Primary data and secondary data were used for this study. The primary data was collected from the Theliialla GN division. Random sample method was used for selected households from Theliialla GN division and other primary data collected using the Interviews, Discussions, photography and Testing water quality. Secondary data was collected using the books, articles, e-resources, and previous research reports and institutional reports. Descriptive methods and statistical methods were used for data analysis

Results

Research findings are clearly indicated that due to rapid growth population, solid waste generation rate, poor management, non-implementation of solid waste legislation and lack of funding are responsible for the solid waste management crises in the Theliialla waste dumping site. The solid waste management system is made negative environmental impacts like land air and water pollution, infectious diseases, blockage of Theliialla stream and loss of biodiversity in Thliialla reservation area. In addition to obviously, it degrades the aesthetic value of the environment, and along with it socio-economic issues. Thus adjusted, the main problems identified in order of priority are: unpleasant odor when garbage is transported, garbage on either side of the main road fallen from the garbage trucks, loss in property value, unpleasant odor due to landfill site, traffic congestion due to garbage trucks and tractors, falling of garbage bags from garbage trucks on either side of the main road.

Conclusion & Recommendation

The solid waste problem is one of the problems in both urban and rural area in Warakapola DS division. On the other hand, before starting any solid waste management program there should be knowledge about the waste generation sources. Because it is very easy to waste minimization and management activity. The solid waste management

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program which has launched by the Warakapola Pradeshiya Sabah should be developed. The Solid waste recycling (Compost) project in Ambepussa Ketagodawatta lies in one ruda and 30 punches area of land. But it isn't practiced in a proper manner. The drinking water project should be established for the villagers who affected to pollution of the water bodies because of waste dumping to this place. While the Waste transportation it is essential of covering the tractors for avoiding the garbage bags falling down the roadsides and spreading odors.

Keywords: solid waste disposal, water pollution, solid waste management, environmental issues.

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Water resource management for improved agriculture in the fertile dry lands of Jaffna Peninsula

Extended Abstract

Vidura Perera¹

Background

Dry lands in the Jaffna Peninsula are identified as arid, semi-arid and sub-fertile ad fertile. The most important factor about rained agriculture is that, agro-products are closely related with the variability of rainfall (Allen, et al. 1998). Farmers in such dry lands often face weather related challenges, which introduce risk and uncertainty into their productive activities. Most of the dry lands are subjected to high annual variability in the length of the rainy season and in the distribution of rainfall within the cultivation seasons. The nature of rainfall events seriously affect the farming activities, despite the fact that most farmers often cultivate only one season per year (Anderson 2009). They experience severe water shortages if they attempt to cultivate two seasons and therefore, the wise use of water becomes a real necessity. Any imprudent in water control and supply will result in improving household incomes by at least 50% since the soil is of prime quality in the dry lands of Jaffna (Hydro geochemical characterization of Jaffna's aquifer systems in Sri Lanka 2013). However, a preliminary study suggests that, improved agriculture and water resource management in Jaffna's fertile dry lands is a real challenge, if overcome has the potential to increase farmer incomes and make significant contributions to increase the national agricultural production (Hydrological Sciences Journal, 2007)

Objectives

Proper management at improved agricultural water management for dry lands, in Sri Lanka northern province special references with Jaffna area having the fertile dry lands, for mostly suitable to the cultivation (Balendran, 1969). If the regions have the water facility which mean irrigation they

can cultivate two wise. Consequently, objective of this study is to analyse present literature partiality to agriculture water assessment methods apply to recently supporting various assess the potential role of agriculture water management in increasing resilience to shocks in the dry lands of Jaffna.

Methodology

Most previous studies of irrigation potential across Jaffna have focused on technical factors, taking into account the availability of arable land and water resource management. They applied to issues such as most suitable irrigation methods, economic considerations. Therefore, an attempt is made here for searching the most applicable methods for, data generating and analyzing and in

interpreting results and modern techniques in irrigation engineering.

Results

A correlation between rainfall and cultivation was found making it possible to introduce a new index to determine the relationship between dry land cultivation and farmers income. Namely, FNI (farmers new income, $FNI = \text{current income} * 2$). It can be used as one seasonal income and if there is water recourse then use to FNI index and calculate the correction between income and water resource management. This is only a basic finding but it may be possible to apply it at national level to dry lands in the country.

Conclusion and recommendation

Sri Lanka has a large extent of dry lands but they have low productivity due to water scarcity and uncertainty of rainfall and the high risk of cultivation. Therefore, its clear main problem is water resource management is the predominant need today. The proposed FNI may serve as a useful analytical tool. Introduction of water-saving irrigation practices and techniques are essential to manage the dry-season water demand and availability.

Key words: Jaffna dry lands, irrigation engineering, agriculture, water management, FNI index.

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Managing the drying up natural springs in the Central Highland in Sri Lanka: A case study at Liyangahawela in Bandarawela

Extended Abstract

PWCD Weerathunga ¹

Background

Basically water resource aquifer exists as surface water and the ground water resource. Groundwater resources are stored in shallow or deep aquifers. Groundwater is one of the most important natural resource in Sri Lanka. 'Groundwater is a hidden resource, which is more reliable and also less subject to ground variation as in the case with surface stream and river (Panabokke, 2007). Spring water is one of the groundwater resources which is different from the groundwater stored underground. 'A spring is a natural flow of ground water from soil or rock surface and occurs wherever ground water table intersects with ground surface' (Arumugam, 1974). Fresh water from natural springs which has remained largely as an untapped resource offers a huge potential for alternative water resource for the rural community. Natural springs are vital to the country's well-being as they are the main water source that feed the stream which in turn nourishes the river system. Liyangahawela is one of the area which presents natural springs in the central Highland. In this area people use this natural spring water for drinking and other needs. Because of the development of tea industries in hill area, a large number of springs are dried and some have been damaged and many springs are threatened by deforestation. Not only had those buildings of settlements are another reason for drying up of these natural springs. At present most of the people receive their drinking water from the Water Supply System because natural springs have been dried up. Now these springs only activate in the rainy season. The people and the ecosystems are affected.

Spring water in hill areas is the potential force of water which is the watershed of most river system. Therefore, drying up of natural spring is affect to whole the country. It is good for find out what are the causes of drying up and give solutions for this problem and also this study is very useful for the future researchers.

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Objectives

General objective of this study was to formulate a management strategy for regeneration of the springs. The Specific objectives of this study were to assess the causes of drying up the natural spring in the selected area; to study the effect of drying up the natural spring in the selected area and to propose conservation appropriate methods for the optimal utilization of the springs.

Methodology

This study was based on both primary and secondary data. The primary data were collected using questionnaire survey. 30 people were randomly selected as the sample. Descriptive statistics were calculated using Excel application.

Results

The main cause of drying up of the springs was related with human activities in the upper catchment, such as cultivation of tea, planting *Pine* trees, cultivating vegetable, and constructions of buildings. In general, forest cover in catchment area has been reduced around 20%. All above human activities have negatively affected to reduce surface flow and the groundwater table. In addition, vegetable cultivation has reduced the quality of water by mixing the agrochemicals to the ground water. Land policy is another factor that aggravating the problem. Forest lands belong to the Department of Forestry have been sold to private owners for construction of hotels and residents. Meanwhile, some of the lands are being encroached by the community dwellers for vegetable cultivation. In addition, Tea small holders have also expanded their plantations to the former forest area. Inefficiency of the Forest Department combined with political force has created a situation where people act on their own. The community influences politicians to reduce vigilance of the Forest Department. Above behavioral pattern was related to their attitudes of national conservation policies. People are considering cultivation more important than the natural resources. The root cause is the ownership of lands by government and the people do not realize that the resource degradation will affect them.

Conclusion and Recommendation

Landscape of the capital highland of Sri Lanka possesses a potential force of water which is the watershed of most river systems. And also most

rural people depend on spring water resources. Therefore, protection and conservation of natural spring is important issue. Water Resources Board has initiated a program towards the conservation and protection of natural springs and other potential water sources. And this research, recommended for all springs in private land must be declared by law to be the property of the state and apply strict law for growing Pine trees in hill area. And carry out an awareness program to the general public about the natural springs and protection methods. Implementing tree cultivating program in Hill area is other spring water conservation method.

Key words: Spring water, Water, drying up, ground water, courses, resource.

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Potential for establishing community – based water supply system for Medirigiriya DS division in Polonnaruwa district

Extended Abstract

NPGHK Wickramaarachchi¹

Background

Water is the unique gift of the mother of nature. Although water is the most widely occurring natural resource on the earth basically water resource aquifer exists as surface water and the ground water resource. However, there are many kind of pollution in the earth and drinking water pollution dominates among other pollutions. The most critical problem at the country right now seems to be the drinking water problem in Polonnaruwa and surrounding areas in recent years. More than one million people in Sri Lanka or almost 120,000 families have been seriously affected by the drinking water problem in eight districts. These areas include Polonnaruwa, Hambanthota, Monaragala, Ampara, Vavuniya of districts (Wijerathna, 2012).

Medirigiriya Divisional Secretariat is located in Polonnaruwa district where these people are facing a severe drinking water problem. In addition to that lack of drinking water has gone on strict in areas of Welikanda, Dibulagala, Lankapura, Tammankaduwa and Manampitaya (Pullan, 2016). There are various reasons affecting to reduce the potable water in that area. Further these areas have increased social, economic & environmental impacts due to drinking water problem. The water capacity of the main tanks in the Polonnaruwa district has rapidly decreased as a result of the dry climatic conditions. Then water levels are below 20%. Some are even 10% or low (Munasinghe, 2015). The dry climatic conditions are prevailing for the two or three months which will be no rains until the end of September for August month and now it is getting to a burning problem.

Objectives

The study has identified general objective and four specific objectives to reach the general objective. The general objective of this research was to identify potential for establishing community - based water supply system for Medirigiriya division in Polonnaruwa district. In order to

achieve above general objective the study was identified four specific objectives. The specific objectives of this study were to study the theoretical approaches to understand quality of drinking water; to identify management strategies used in resolving drinking water problem; to identify the causes of drinking water problem and to formulate management strategies to resolve the drinking water problem.

Methodology

In this study, the data gathered were primary data and secondary data. This review was used primary data by the interview, questionnaires and field survey. Also published books, newspapers, leaflets, magazine, reports, other documents and Websites related of community – based drinking water supply system were used for secondary data. Fifty five samples were selected by stratified random sampling method. Selected Grama Niladari Divisions were Wadigawewa, Meegaswewa and Mahathanakolawewa. The simple statistical analysis methods, GIS software, SPSS and EXCEL applications were used to data analysis. Then the collected data were presented by tables, graphs and maps.

Results

The study had identified mixed of chemical items as a major agent for lack of drinking water among human activities as well as had identified dry period and hardness water of agents as major agents among natural activities and anthropogenic activities have been especial evidence in this research. In this study have been recognized as suitable prevention methods waste drinking water treatment plants, septic tank system, governments and laws, several project and programs such as Gamidiriya, Mahaweli, Moragahakandha, Kalugaga projects and Other water plants projects. Unless in future, this study area will be foresee severe burning problem situation.

Conclusion & Recommendations

Drinking water problem is a major problem in the world. Drinking water problem is to manage the society's various activities in a manner that the Environmental Protection Agency and several drinking water management strategies. As a result of anthropogenic activities drinking water has been polluted massively.

It is required to take some activity to improve the water in Madirigiriya area such as applying

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concepts, strick laws, educationary people etc. for future generation.

Keywords: drinking water, dry climatic, impacts, human activities, management strategies

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Water pollution of Kelani River and how it affects to the Yatiyantota area

Extended Abstract

KVDS Ranjith¹, PSK Rajapakshe

Background

Water pollution is one of the major global problems and contamination of water bodies (e.g.; lakes, rivers, oceans, aquifers and ground water) can be defined as any physical, biological or chemical change in water quality that adversely affects living organisms or makes water unsuitable for desired uses. Sri Lanka is a tropical country and it is evident that most of the water has been polluted due to man-made activities. Since last few decades, Kelani River is the largest recipient of the industrial effluent among all the other rivers in Sri Lanka (Mahagama, 2014). This is mainly due to the deterioration of water quality and the higher pollutant loads resulting from various point and non-point sources of pollution (Athukorala, 2013). Apart from that, it polluted due to carelessness of the people and lack of strict rules & regulation for prevent water pollution of Kelani River.

Objectives

This paper attempts to identify existing situation of the water pollution of Kelani River and how it affects to the Yatiyantota area. Furthermore to identify sources of water pollution of river & the water quality of Kelani River and also this study focus on to examine the scenic beauty of the river side & propose the prevention measures of water pollution.

Methodology

Most of areas in Sri Lanka have faced serious problems of water pollution. In yatiyantota area is also becoming impacts of Kelani river water pollution. The study area was comprises 26 km from Kirigothenna to Yatiyantota area. In this research information based on primary data & secondary data based on the random sampling method, 30 respondents were selected and data were collected based on the questionnaire has been

used to collect primary data. These thirty samples were distributed to different stakeholders. Furthermore, primary data collected via observation, interviews of relevant government authorities & departments. Some primary data collected from Disaster Management Office, Municipal Council & Water Board in Yatiyantota area. Secondary data has been collected from leaflets, books, newspapers & reports. The collected data was analyzed in Excel & Represented by graphs, chats & percentage values.

Results

The research findings revealed that 87% of respondents are getting water from pipe line. Pipe water is supplied by the water board. The Water Board gets water from Kelani River for supply to people who live in there. The river is contaminated by so many things. The main source is the land based sources. There are treated & untreated industrial waste, agricultural runoff, domestic & municipal waste. According to the data polythen, plastic, paper, sewage, chemical & silt waste are consist in river side. From them polythen waste is the major waste type in this area. It is 40% from waste collection. Water rafting, sand mining, rubber land removing, soil erosion, tourism industry, Board-land water plantation project activities and waste of vehicle service centers are cause to this situation. Above reasons generate lack of water problem in Theligama hospital & paddy fields, reduce the fish rate, destroy biodiversity, damage to agriculture activities & change the water quality. There are 19 bathing places in Kithulgala to Karawanalla. Most polluted places are Kabulumulla bathing port, Kithulgala north rest house, Yatiyantota main bathing port. Most of fauna species live in river side. They are becoming extinct from environment. There are Thola rathu veligowuwa, Ashoka pethiya, Bulath hapaya, magpies, palm civet, bat, butterflies, and prawns. This dangerous situation is most affect to fish rate of Thola rathu veligowuwa, Ashoka pethiya. Some endemic flora species are face to the critical situation. (*Garoinia Quesita*, *Coscinum Fenestratum*, *Gordonia Speciosa*, *Cinnsmoun Dubilm*, *Arocarpus Nobili*)

Conclusion & recommendations

According to the case study there is a huge water & environmental pollution in kelani river area. It creates a critical situation. It can be damaged to

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environmental, economic & historical value of Yatiyantota area. As an environmental friendly community should be continued the proper waste management system and awareness program for changing public attitudes and strict legal actions should be taken for protect the Kelani River.

Keywords : Water, Pollution, Kelani River, Contamination

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Contamination of Nuwarawewa and how it affects to the surrounding communities

Extended Abstract

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Background

Water is precious and unique resource in the earth. Present day water pollution is a major global problem which requires ongoing evaluation and revision of water resource policy. It has been suggested that water pollution is the leading worldwide cause of deaths and diseases (Pink, 2006). When it comes to the Sri Lankan context, the reservoir pollution has become a huge problem in Sri Lanka and Nuwarawewa is one of the highly polluted reservoirs. It is a man-made tank, situated in Anuradhapura city area. Since hundreds of centuries it serves to the people that providing the water for agriculture and human activities of the Anuradhapura area. Recently, mainly because of anthropogenic activities water quality data indicates that the pollution in Nuwarawewa is reasonably high (Perera, et al, 2014).

Objectives

This research mainly assesses how the human activities affect to the Nuwarawewa and its catchment area. Furthermore, it focuses on negative impacts on aquatic life, scenic beauty and the human health of the related area. This study also proposes proper measures to reduce these impacts.

Methodology

Nuwarawewa is one of the highly polluted major reservoirs located in the Anuradhapura district. Therefore, Nuwarawewa and communities living around the reservoir have been chosen as the study area of this research. In order to achieve the objectives of this study, the required data were collected from both primary and secondary sources. Random sampling method was employed in order to determine the sample size and 30 households were selected from the adjacent villagers around the reservoir and primary data was collected based on the structured questionnaire. Each respondent was questioned over their usage of the reservoir for the different purposes, their perception on the existing water quality and the water pollution.

Furthermore, field observations were carried out and a formal discussion was conducted with the Senior Engineering Assistant of the National Water Supply and Drainage Board (NWSDB), Anuradhapura. The other required secondary data collected using previous studies, related books, internet, etc. To analyze the data of this research mainly used Excel and represented them using graph, charts, and tables.

Results

According to the analysis of the survey primary data it revealed that 26% of the village people use the tank directly for day today activities. It is comparatively lower than pipe usage and higher than tube well and other sources. It further reveals that, tank water usage for cleaning and bathing activities is significantly higher as 54% where as 76% of surrounding people use the Nuwarawewa for their agricultural activities. Moreover, over 70% of respondents expressed that the water quality of the Nuwarawewa is very low and NWSDB data also revealed that the water quality is very low during the dry seasons and sediment of the water is very high. Water quality data indicates that the turbidity level in Nuwarawewa is also high with a greater standard and the pollution of Nuwarawewa also reasonably high (perera, et al, 2014). Polythene, plastics and paper waste were the mostly founded pollutants in the catchment area of the tank especially Poson and Wesak poya seasons and the accumulation of the pollutants significantly high. Cow dung of the grazing cattle near the tank reservoir gets mixed up with tank water and many human unintentionally add nitrogen and phosphorus and other pollutants add to the water. Garbage and waste water discharge of tourist hotels and holiday homes around the Nuwarawewa. Overflowing toilet drainage systems in Ranasevapura pollute the tank water. People built houses and other buildings in the catchment area or near to the reservoir because the boundary of the reservoir is not clearly demarcated yet by the relevant authorities. As observation contamination of Nuwarawewa affects the entire biosphere plants and organisms living in the body of water. In almost all cases the effect is damaging not only to individual species and population but also agricultural and human health also.

Conclusions and Recommendations

The result of this study revealed that impacts of the Nuwarawewa pollution spread all over the surround

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environment and if these trends continue, it can be damaged to the historical value, eco-system servisu and economic value of the Nuwarawewa. As a responsible community has a great responsibility to take actions to protect and enhance Nuwarawewa environment and cultural resources as a legacy for present and future generation. Creating awareness program for changing the attitudes of people and educate the general public about ancient irrigation system and environment. Practicing and encouraging the conservation and efficient use of tank based resources. Developing proper waste disposal methods, taking strict legal actions and improve the attitude of the people about the rules and regulations related to the water pollution and environmental pollution in wewa and surround area.

Key words: contamination, reservoir, aquatic life, water pollution, environmental

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නිල්වලා නදියෙහි ජලය අවප්‍රමාණය වීමත් සමඟ ලවණ ජලය එකතුවීම හා බැඳුණු අර්බුදකාරී තත්ත්වයන්හි ස්වභාවය

දීර්ඝ සාරාංශය

ටී.පී.පී. කොඳරායා¹, එච්.කේ.එන් ලක්මණි, ඩබ්ලිව්.පී පාඩ්ප්පෙරුම, එච්.ඒ.ටී වාසනා, එම්.එම් තිලානි¹

හැඳින්වීම

නිල්වලා ගංගාවේ එක් සුවිශේෂී පිහිටීමක් වන්නේ ඉහළ උන්නතාංශයක පිහිටි ජල පෝෂක ප්‍රදේශයට සාපේක්ෂව අඩු බැවුම් තලයක් ඔස්සේ වැඩි දුරක් ගමන් කිරීමට සිදු වීමයි. මෙම පිහිටීම පහළ නිල්වලා නිම්නය අතින් සිටිම ගංවතුර උපද්‍රව්‍යයට ගොදුරු වීමට හේතු විය.

ගංගාව හා ප්‍රජාව අතර අතීතයේ සිටම පැවතියා වූ මෙම සබඳතා මෑත දශක දෙකක පමණ කාලය තුළදී සාධක කිහිපයක් හේතුවෙන් අහිමිවී ගියේය. ඉන් ප්‍රධානතම සාධකයක් ලෙස ශ්‍රී ලංකාව තුළ ඇති වන වර්ෂාවේ හිඟ කාලයන් සමඟ මිරිදිය ජලය හා කරදිය ජලය මිශ්‍ර වීම යන ගැටළුව හඳුනා ගත හැකි ය. මේ නිසාවෙන් නිල්වලා ගංගාව ආශ්‍රිතව ජීවත්වන ප්‍රජාව මෙන්ම මාතර දිස්ත්‍රික්කයේ ජල සම්පාදන හා ජල ප්‍රවාහනය සම්බන්ධව ද බොහෝ ගැටලුකාරී තත්ත්වයන් නිර්මාණය වන ආකාරය හඳුනා ගත හැකි ය.

අරමුණු

නිල්වලා නදියෙහි ජලය අව ප්‍රමාණය වීමත් සමඟ ලවණ ජලය එකතුවීම හා බැඳුණු අර්බුදකාරී තත්ත්වයන්හි ස්වභාවය සමාජ විද්‍යාත්මක දෘෂ්ටිකෝණයකින් හා භූගෝල විද්‍යාත්මක දෘෂ්ටිකෝණයකින් අධ්‍යයනයට ලක් කිරීම මෙම අධ්‍යයනයේ පොදු අරමුණ වන අතර ඊට සාපේක්ෂව පසුගිය කාල පරිච්ඡේදයේ කුමන කාලයන් තුළ ජල හිඟය ඇති වීමත් සමඟ කොපමණ ප්‍රමාණයකින් ලවණ ජලය ප්‍රමාණයක් මිශ්‍ර වූයේ ද යන්න පරීක්ෂාවට ලක් කිරීම ඒ හේතුවෙන් පැන නැගුණු සමාජීය හා ආර්ථික ගැටලු හඳුනා ගැනීම හා එම තත්ත්වයන් වළක්වා ගැනීමට විසඳුම් යෝජනා ඉදිරිපත් කිරීම මෙම අධ්‍යයනයේ විශේෂිත අරමුණු වේ.

ක්‍රමවේදය

ප්‍රාථමික දත්ත රැස් කිරීම සඳහා ක්‍රමවේද කිහිපයක් භාවිත කරන ලදී. එනම් ප්‍රශ්නාවලි, සම්මුඛ සාකච්ඡා, සෘජු නිරීක්ෂණ හා සිද්ධි අධ්‍යයනය යි. ප්‍රශ්නාවලි සඳහා නියැදි නිර්මාණ කිහිපයක් භාවිත කරන ලදී. ගංගාව සමීපයෙහි පිහිටි නිවාස ගංගාව සමඟ බද්ධ ජීවන රටාවක් පැවතීම හා ගංගාව දෙපස හා සමීපයෙහි වගාබිම් පිහිටා තිබීම නියැදිය අහඹු ලෙස තෝරා ගනු ලැබිණි. ඉහත නිර්ණායකවලින් බැහැරව ප්‍රතිචාරයකයින්ගේ දත්ත රැස් කිරීම සඳහා සම්මුඛ

සාකච්ඡා ක්‍රමය යොදා ගන්නා ලදී. ප්‍රමාණවත්කම විශ්ලේෂණය සඳහා පාදක වන දත්ත ප්‍රශ්නාවලි මගින් රැස් කරන ලද ඒවා වේ. ගුණාත්මක තොරතුරු ලබා ගැනීමේ ප්‍රධානතම මූලාශ්‍රය ලෙස සම්මුඛ සාකච්ඡා ක්‍රමවේදය භාවිත කරන ලදී. සම්මුඛ සාකච්ඡාවල උප ප්‍රභේද වන අවිධිමත් සම්මුඛ සාකච්ඡා අර්ධ ව්‍යුහගත සම්මුඛ සාකච්ඡා හා විවෘත සම්මුඛ සාකච්ඡා මගින් වැඩි තොරතුරු ප්‍රමාණයක් රැස්කර ගැනීමට හැකියාව ලැබුණි. අධ්‍යයන ප්‍රදේශයේ කරන ලද නිරීක්ෂණ මගින් වෙනත් ක්‍රමවේද ආවරණය කර ගත නොහැකි වූ කරුණ ආවරණය කර ගැනීමට හැකි විය. ආයතනික මූලාශ්‍ර වශයෙන් අධ්‍යයන ප්‍රදේශයේ සීමාව තුළ එනම් මාතර දිස්ත්‍රික්කයේ පිහිටි ජල සම්පාදන හා ජල ප්‍රවාහන මණ්ඩලය යන ආයතන ඉතා වැදගත් විය. ඊට අමතරව අන්තර්ජාලය, මුද්‍රිත ග්‍රන්ථ සහ වාර සටහන් ද ද්විතීයික දත්ත හා තොරතුරු රැස් කිරීම සඳහා පාදක කර ගන්නා ලදී. දත්ත විශ්ලේෂණය හා ඉදිරිපත් කිරීම සඳහා සිතියම්, සටහන්, හා ඡායාරූප භාවිත කරන ලදී. මෙම අධ්‍යයනය සමාජීය භූගෝල විද්‍යාත්මක අධ්‍යයනයක් බැවින් ගුණාත්මක තොරතුරු කෙරෙහි වැඩි අවධානයක් යොමු කරයි. මෙම තොරතුරු ඉදිරිපත් කිරීම සඳහා වග, ප්‍රස්ථාර යොදාගෙන තිබේ.

නිල්වලා ගංගාවේ පහළ ජලධාරය ආශ්‍රිතව පිහිටි කුඩාව ගම් ප්‍රදේශය හා නාදුගල ගම් ප්‍රදේශය මෙන්ම මාතර නගර සීමා ප්‍රදේශය අධ්‍යයන ප්‍රදේශය වේ. ඉහත සඳහන් කරන ලද ප්‍රදේශවල ජීවත් වන ජනතාව මුහුණ දෙන ප්‍රධානතම ගැටලුවක් වන්නේ වර්ෂාව හිඟ කාලයක් සමඟ නිල්වලා ගංගාවේ ජල මට්ටම පහළ බැසීම හේතුවෙන් මිරිදිය ජලය සමඟ ලවණ ජලය මිශ්‍ර වීමයි. මේ නිසාවෙන් එම ප්‍රදේශ ආසන්නව ජීවත්වන ප්‍රජාවට තම දෛනික වැඩ කටයුතු සුපුරුදු පරිදි පවත්වාගෙන යාමට නොහැකි වීම හා පානීය ජලය සපයා ගැනීමේ දී අතිශය දුෂ්කරතාවලට මුහුණ පෑමට සිදු වේ. මේ හේතු සලකා බලා ඉහත සඳහන් කළ අධ්‍යයන ප්‍රදේශය අධ්‍යයනය සඳහා යොදා ගන්නා ලදී.

ප්‍රතිඵල

අධ්‍යයන ප්‍රදේශයේ ප්‍රජාවට ඉහත සඳහන් කාල වකවානු තුළ ජලය භාවිතය සම්බන්ධ ප්‍රධානතම සංරෝධක වන්නේ පානීය ජලය සපයා ගැනීම සම්බන්ධ ගැටලුකාරී තත්ත්වයයි. මාතර නගර බල ප්‍රදේශය තුළ මෙන්ම, කුඩාව, නාදුගල යන අධ්‍යයන ප්‍රදේශවල ජීවත් වන ප්‍රජාව තමන්ට එදිනෙදා භාවිතයට අවශ්‍ය පානීය ජලය සපයා ගන්නේ මෙම නිල්වලා ගංගාව කේන්ද්‍රගත කොටගෙනය. නමුත් නිල්වලා ගංගාවට ලවණ ජලය මිශ්‍ර වීමත් සමඟ පානීය ජලය සපයා ගැනීම සම්බන්ධව බොහෝ ගැටලු මෙම ප්‍රජාවට සිදුවේ. මීට අමතරව ආයතනික වැඩ කටයුතු කෙරේ ද මෙම තත්ත්වය දැඩි බලපෑමක් එල්ල කර ඇති බව ද ඒ තුළ පැහැදිලි වේ.

මෙම තත්ත්වය ප්‍රජාවගේ සබඳතා දුරස් වීම කෙරෙහි බලපා ඇති බව පැහැදිලිව හඳුනා ගත හැකි ය.

මේ නිසා පහළ නිල්වලා නිම්නයේ පදිංචි ප්‍රජාවගේ බහුතරය සමඟ පැවති තම සබඳතා දුරස් වී ඇති බව පිළිගනී.

¹ භූගෝල විද්‍යා අධ්‍යයනාංශය ලරැහුණු විශ්ව විද්‍යාලයල මාතර ල ශ්‍රී ලංකාව ග

වග අංක 01 ප්‍රජාවගේ ආර්ථික පරිසරයට වූ බලපෑම

තෝරාගත් ප්‍රදේශ	බලපෑමක් ඇත.		බලපෑමක් නැත		එකතුව	
	ප්‍රතිචාරයන්	ප්‍රතිශතය	ප්‍රතිචාරයන්	ප්‍රතිශතය	ප්‍රතිචාරයන්	ප්‍රතිශතය
තුඩාව	11	45	22	55	40	100
නාදුගල	22	55	18	45	40	100

ආශ්‍රිත ග්‍රන්ථ

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මේ අනුව මෙම ගැටලුකාරී තත්ත්වය ප්‍රජාවගේ ආර්ථික කටයුතු කෙරේ දැඩි බලපෑමක් එල්ල කර ඇති බව ඉහත වග අංක 01 පරීක්ෂාවෙන් පැහැදිලි වේ.

සාරාංශය

ඒ අනුව 2050 දී ලෝකයේ මුළු ජන සංඛ්‍යාවෙන් 42% ප්‍රමාණයක් මූලික ජල අවශ්‍යතාවන්ගෙන් බැහැරව ජීවත් වීමට සිදු වනු ඇති බවට විශ්වාස කෙරේ. මෙම වාතාවරණය සඳහා මෙම ගැටලු සහගත තත්ත්වය ද හේතු පාදක වනු ඇත. එබැවින් ජලය වෙනුවෙන් ගත යුතු ක්‍රියාමාර්ග අද හෙටම ප්‍රතිපත්තිමය වශයෙන් ක්‍රියාත්මක කළ නොහැකි නම් නීත්‍යානුකූලව හෝ ක්‍රියාත්මක කළ යුතු තත්ත්වයට පත් කළ යුතුය. මේ සඳහා ජලය ආරක්ෂා කිරීම හා සුරක්ෂිත කිරීම, ජලය අපවිත්‍ර වීම, රසායන එකතු වීම, යන කරුණු පිළිබඳව අවධානය යොමු කළ යුතුය. මීට අමතරව ජල සම්පාදන හා ජලාපවහන මණ්ඩලය හා ආපදා කළමනාකරණ මධ්‍යස්ථානය එක්ව ජල බවුසර් මඟින් පීඩාවට පත් ජනතාවට ජලය බෙදා හැරීම සඳහා ක්‍රියාත්මක වීම මෙවන් අවස්ථාවන්වල දී කළ යුතු වන අතර ප්‍රජාව විසින් වාර්ෂා කාලයේ දී ජලය නියමාකාරයෙන් කළමනාකරණයෙන් යුතුව භාවිතයට යොමු වීම ද ඒ සම්බන්ධව ගඟ දෙපස පදිංචි ජනතාවට අවබෝධයක් ලබා දීම ද ලවණ බාධකයේ ක්‍රියාකාරීත්වය වැඩි දියුණු කිරීම කෙරේ අවධානය යොමු කිරීම මේ සඳහා ගත හැකි පිළියම් වේ.

මුඛ්‍ය පද

නිල්වලා නදිය, ජලය, අධ්‍යයනය, ගංගා

Water purification methods: A case study in Mihintale in Anuradhapura district of Sri Lanka

Extended Abstract

RMSM Rathnayaka¹ NSK Herath

Background

Millions of people in the world die every year from water borne diseases. Such as cholera, typhoid, tooth decay and bowel diseases (S.Chanda, 1992). Water quality is defined in terms of the chemical, physical, and biological content of water. Biological Oxygen Demand (BOD) relates to the amount of organic material in the water. (Tebbutt, 1998). Filtration in various forms is so far the only method to clean water, apart from UV- purification, whether it is a traditional slow sand filter or a reverse osmosis system or a modern, large scale filter in a water purification plant.

Although less than 1% of the water on this blue planet is fresh water suitable for human use and a lot of water we do have is enough to support everyone (Bryan, 1997). As a result of reduction water quality Sri Lanka day by day is increasing kidney disease is evident . The worst affected areas in the Anuradhapura District are Padaviya, Madawachchiya, Kebetigollewa, Rambewa, Mihinthale and Mahawillachchiya (Amarasiri, 2015). Therefore, various types of water purification methods are used in this area. This is currently an issue in Mihintale. In Mihintale has many water purification methods but water borne diseases are not reduced. Looking for existing appropriate technology for purifying water in Sri Lanka with a special focus in Mihintale. Background is also provided on water, the diseases associated with unsafe water and their effect on people. Mihintale is the one of areas which is suffering from the water borne diseases.

Objectives

The overall aim of this study was to identify drinking water purification methods in Mihintale Divisional Secretariat division, to examine whether reducing or increasing existing problem although several types of purification methods, to calculate water quantity that was used by a man per a day, to identify issues related methods of water purification and to proposed suitable water purification method for Mihintale area.

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Methodology

Both primary and secondary data were used for this study. Primary data were collected by field observation, using questionnaire and participatory observation. The study was conducted in Mihintale Grama Niladari division. 30 respondents were selected in Mihintale GN division. Books, magazines, newspaper articles leaflets and internet were used as secondary data. Both Qualitative and quantitative methods were used for data analysis. Graphs, charts and tables in Excel were used to present the data.

Results

This study mainly used that questionnaire for selected 30 people of random sample whose are live in Poson Mawatha area in Mihintale. High percentage of people gets water for their domestic water from Pipe. Its rate is 90%. It also shows that 5% people of random using water for their domestic activities from well water. Further, 5% get water from filtered water for their domestic activities. Main tap water purification system is situated in Anuradhapura. Also 30% of people using pipe water for their drinking activities and 10% people drink bottled water. 50% people stated that they use purified water as it provides the good taste. However, it is not an appropriate indicator to measure the quality of drinking water. Also 30% people like its appearance. As well as 15% of villagers said that they concern about water quality of the purified water. Most of villagers are not concerned about the quality of water. 5% of people hadn't any idea about purified water. Because they have not much aware about the adverse health impact created by drinking low quality water. Therefore, sometimes they use tap water for drinking. 65% of the respondents drink purified water. They buy purified water from the RO water purification plants located nearby. Also 20% of people using own filter at home for their drink and 15% of people drink boiled water. Researcher found one of best ancient water filtering systems. This is very valuable, healthful, provide save water, ecofriendly system which does not use chemicals, use quartz, pot (clay). However, yet some people drink water without practicing any water treatment method like boiling, filtration and cooling.

Conclusion & Recommendations

According to this survey researcher realized that without water treatment method anyone cannot drink tap water in Mihintale area. According to the Water Supply and Drainage Board, tap water is safe to drink. Sometimes they collect tube well

water in the dry season. Tube well water is not safe to drink.

Some people drink water without any treatment like boiling, filtration and cooling. In the ancient time, there are lots of purification systems used Sri Lankan people to improve water quality. Rural communities used to fix a Palmyra front to the trunk of the coconut tree and collect rain water to obtain drinking water. Then Keep informed about water policy debates at local, regional and state levels. Through this can improve water quality and serve the human health by providing details about how to get clean water.

Key words: water treatment, filtration, RO plants

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Social and environment impacts: A case study of mid canal in Kandy

Extended Abstract

EMHGNP Senavirathne¹, WMSB Wanninayake

Background

Kandy is recognized as a world heritage city by the United Nations educational scientific and cultural organization on account of its long and venerable history and its many cultural treasures. The mid canal originates from the overflow sluice of the Kandy Lake. The length of the canal is about 8km and the width varies from 10km to 15km along it cause from the lake sluice to the confluence with the Mahaweli river at Getambe (Kumara, Perera, 2015). Mid canal is considered the most polluted surface water body in the Kandy district (Jinadasa ,Wijewardhena 2012). Because there is no proper waste water disposal system in Kandy district, mainly untreated domestic sewage release directly into the mid-canal. Water quality in mid canal is mostly diminishing due to wastewater discharge in various sources. Mid canal is mostly important to people who are living in proximity to mid canal. Nearly 350 houses are located along the mid-canal bank. Therefore it is important to study the social and environmental impacts of mid canal.

Objectives

The general objective of this study was to examine the social and environment impacts of mid canal water pollution. Specific objectives were to study the causes of water pollution in medicinal and to study the mitigation strategies to control water pollution in mid canal.

Methodology

This study was carried out based on primary and secondary data. Primary data were collected from Kandy and Suduhumpola areas. A questionnaire survey was conducted with a random sample of 30 households to collect primary data. The secondary data was from books, magazines, newspapers, articles, leaflets and internet. graphs, charts, and tables in Excel were used to analyze the data.

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Results

By this research, the researcher was able to identify the social and environmental impacts due to mid canal water pollution. It was mainly affected to the residents of mid canal bank. The identified social impacts were the conflict among dwellers due to the limited space, narrow roads, bad odor, flash flood and a massive amount of mosquito breeding places. Environmental impacts were mass mortality of fish, pollution of Mahaweli River water, a decrease of aquatic plant and animals, air pollution and the reduction of water quality. The researcher could identified sources of mid canal water pollution, such as markets, hospitals, bus interchanges, hostels and restaurants, banks, laundries, resident houses, prison, slaughterhouses etc. Identified mitigation methods to control the water pollution in the canal were, to develop wastewater treatment facilities, to treat both black water and gray water and to cover the mid-canal by concert slab.

Conclusion and Recommendations

Mid canal was rapidly polluted due to direct disposal of solid waste, untreated waste water. It affects to pollute the Mahaweli River which is the largest river basin in Sri Lanka (Abeygunawardane, 2011). It also causes to diminish the cultural value of Gatembe area. According to the objective of the study, there were a massive amount of environmental and social problems. It is one of the major problems in Kandy Municipality. Cleaning the mid-canal is a responsibility of Kandy Municipal Council. They are implementing various projects to reduce the water pollution of mid canal. The researcher recommends awareness programs to change people attitude, implementation of appropriate solid waste management projects, introducing and implementing new rules and regulations to control water pollution in mid canal and elimination of unauthorized construction etc.

Keywords: mid canal, pollution, environment, social, impact

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What are the sources and solution for siltation of Ketakale wewa

Extended Abstract

MM Premarathna¹, NSK Herath

Background

Earliest Sinhalese had a massive irrigation technology. Wewa is one of the wonderful creations of the people who are in the dry zone as a solution for dehydrated climate. By today, most of tanks in north central province are going to death, because, small tanks facing to serious problem of siltation. There are several sources for siltation. For example absence of local management, poor agricultural practices, construction of urban area and sediment spill from drainage channels. Siltation is a process by which water become dirty as a result of fine minerals particles in the water. When sediment, or silt, deposited in the beds of the reservoir sedimentation take place (Darmasena, 1992).

Agricultural practices in rural areas cause for soil degradation and finally it caused for increasing amount of silt and clay in the water bodies that drain the area. 60% of tanks in north central province had destructed by siltation as well as 60% of water capacity of the tanks has reduced by this issue (Darmasena, 1992).

Today siltation is a one of the major issues in Ketakale Wawa at Eppawala. Disequilibrium of this ecosystem, this destruction took place after Mahaweli Programme. Further in this regard in the agricultural practices and agro chemical usage were the main affecting factors for this problem. At the end as a result of this, the density of aggressive plants like Selvinia Japanjabara and Hambusan lotus has increased in “wewa ihaththawa”. That also has caused for increasing siltation even in the law rain fall situation.

Objectives

The main pupose of this study was to examine the sources, causes and root causes for siltation of Ketakale wewa .Moreover, this study used to identify the other external factors of siltation. Furthermore this research find out how people deal

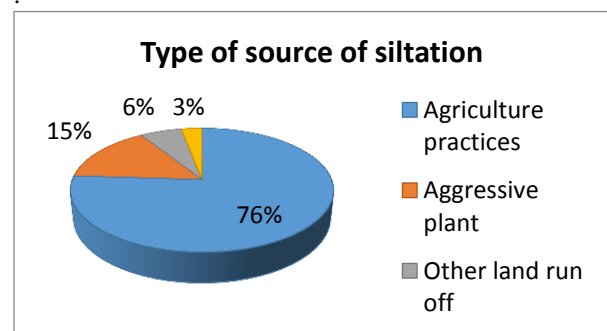
with this problem and also how to manage this problem in Ketakale area.

Methodology

In this study, data were collected through the primary and secondary data collection methods. The secondary data collection method were used by collecting information from the decided on website from the internet, and the primary data collection methods include questionnaires, interviews, discussion and participatory observation. The sample group of the study was 30 families who were key informants and farmers in the village. Finally the data were analyzed through a function of MS excel.

Results

According to this research, harmful sources can be identified as follows chena cultivation and mud land cultivation above the “wewa ihaththawa”. Usage of agro Chemical, unmanaged land use practice, application of new technology are the root causes for damaging the wewa. 65% of the cultivators have paid their attention to law utilization of tank water due to scarcity of water. All farmers are using water management strategy which can be identified as “bethma kramaya”. Some farmers are starting their cultivation at the beginning of the rainy season with the hope of doubt. If it rain time they will fulfill their water requirements from wewa (Thennakoon 1993). At present most of farmers prefer multi cropping such as banana, soya beans, sourghum etc. Because of scarcity of tank water, farmers grow paddy only for daily consumption and due to changing cropping calendar farmers paid their attention to short term paddy cultivation.



In the early time, when the tank capacity 10 feet, 50 acres were cultivated by tank water. By today tank capacity has reduced up to 7 feet therefore cultivable area has reduced up to 10 acres.

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Conclusion and Recommendations

Ketakale wawa is a social and cultural legacy for future generation. The major reason for destructing Ketakale wewa is siltation. It can be desilted by applying eyebrow concept (Darmasena 1992). Today it is considered as the bird island concept. It should be established new methods. i.e water can be pumped to the tank using a channel. Concrete channel systems should be reconstructed in order to convey water efficiently and control mud in to tank should be systematically organized as well as the bund system should be introduce for controlling the erosion and also waste water from the paddy fields should be utilied for a downstream tank.

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Analysis of correlation between prevalence of dengue infection and environmental literacy of residents in selected areas of Anuradhapura district

Extended Abstract

YMPGCPK Yaparathne¹

Background

In Sri Lanka, Dengue is initially confirmed in 1962. The first major outbreak was in 1965 and first major epidemics were reported in 1989. Since 2010, approximately 25000 cases were reported annually (Epidemiology Unit, 2016). The congested areas adjacent to the cities were the most vulnerable places identified. One of the main reasons would be the poor environmental literacy among those residents who have low socioeconomic status. Many studies focused only on symptomatic dengue infection for the calculation of the prevalence of the disease. Therefore, in this study, intended to include both symptomatic and asymptomatic individuals which reflect the actual amount of infection undergoing in a particular community.

This research focuses on the importance of the environmental literacy that helps to improve the quality of the environment and health in Sri Lanka. In today's world, the term environmental literacy serves a very similar function. Environmental literacy is the capacity of an individual to act successfully in daily life on a broad understanding of how people and societies relate to each other and to the natural systems, and how they might do so sustainably. This requires sufficient awareness, knowledge, skills and attitudes to incorporate appropriate environmental considerations into daily decisions about consumption, lifestyle, career, and civics, and to engage in individual and collective action (O'Brien, 2007).

Objectives

Proper management of the environment is required to control the dengue prevalence in all districts of Sri Lanka. This research mainly focused on identifying the relationship between prevalence of dengue infection and environmental literacy of the residents in selected areas of Anuradhapura district. Identifying the situation of the prevalence of

dengue and level of environmental literacy among the community of the study area is addressed by this research.

Methodology

Two Grama Niladari (GN) divisions with and without dengue prevalence in Anuradhapura District were selected for this study. Investigation of the prevalence of IgG antibody in a community can be used to estimate how much of that particular community has been infected by the virus. The primary data about the environmental literacy was collected by using questionnaire, field observation, and interviews. This study applied non-parametric correlation method to analyse the data.

Results

According to the results of this research, residents living in Nuwara wawa GN division have high environmental literacy level than the Wannikulama kotasa IV GN division. Further, according to the IgG antibody test, 4.3% of dengue prevalence reported in Wannikulama kotasa IV GN division. Although there is a relationship between environmental literacy and dengue prevalence in both areas but environmental literacy is not the main reason that affects to the dengue prevalence in the Wannikulama kotasa IV GN division. According to the field observations, it was found that high population density and unplanned waste management are the main reasons for the dengue prevalence in Wannikulama kotasa IV GN division.

Conclusion and Recommendation

According to the data analysis of this research, it was able to realize that some interpretations about the reasons that affect the dengue prevalence. Some suggestions to control the dengue problem can be given not only in the study area but also at the national level. In the light of the present study, the health authorities are recommended to enhance the knowledge and application of preventive measures through a massive awareness campaign. In order to improve the situation of dengue controlling process, it is essential to introduce new techniques and new standards for the houses and other constructions in order to control the mosquito breeding places. Local authorities should not give permissions to construct the houses and should not approve the plans without the standard dengue controlling techniques for the houses. The government should incorporate the environmental management, environmental pollution, and solid waste management strategies into the school

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syllabus, especially in primary and secondary education system in Sri Lanka.

Keywords: dengue prevalence, environmental literacy, Anuradhapura, pollution, education

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Reduction of flood risk vulnerability: A case study in Kalukunnamaduwa GN Division of Boo Oya stream in Vavuniya

Extended Abstract

ANPWMRCP Athurupana¹, DMSLB Dissanayake

Background

A flood is defined as a body of water that rises to overflow into land settlements which are not normally under water (Aritina, 2012). Flood invariably creates the problem of a serious nature. Boo Oya is located in Kalukunnamaduwa GN division of Vavuniya South DS division in Vavuniya district. This is a natural stream flow through the border of the village which provides a number of benefits to the mankind as well as becomes hazard initiator to them in rainy seasons. The entire Vijayabagama village and some other dwelling at the vicinity of the Boo Oya are inundated in rainy seasons due to overflowing this stream. In heavy rain duration, about 30 families in Vijayabagama are affected by floods. Also local business industries and transport system of A9 road can be obstructed by overflowing Boo Oya stream.

Objectives

The general objective of this research was to propose a suitable solution to make people protect with minimal damage. Specific objectives were to study flood management practices, recognize various flood management methods make affected people ensure minimizing flood vulnerability and propose recommendations for reducing flood risk.

Methodology

Two main data collection methods have been used primary and secondary data. Especially the primary data has played a vital role. Here field visit, informal and formal interviews, participatory and observations were used as primary data collection method. Because this research is based on GIS map analysis, various spatial data related to GIS has been used to create relevant maps (Abderrahim, 2015). Spatial GIS datasets can include surgical geological characteristics of the region namely land use, physical features, the location of structures, vegetation as well as critical facilities (Abdellah,

2002). 29 GPS locations were taken from each household to recognize the flood affected houses of this particular area. The projection was GCS WGS 1984. A questionnaire survey was also conducted to have sociological information. The GIS software was used to analyze data as a tool. And also SPSS software was also used for supplementary analysis.

Results

The only thing that people have to do in flood season is going to an evacuation center situated in Kalukunnamaduwa. People have also come here not knowing what to do, but they were brought here to protect the bridge of Kalukunnamaduwa from LTTE. Under the Participatory and listening observation, the researcher has met some villagers of this village. They said that they had no solutions during flood season. The only thing they do is going to the evacuation center situated in Kalukunnamaduwa. Also they had been brought to protect the bridge of Boo Oya from LTTE. According to the view of people they will have not a proper livelihood if they are brought to a new place. At the same time, they have not a lot of spends to build a new house like these permanent houses. According to the divisional secretariat in Vavuniya DS division, he said that people don't like to go anywhere even though the land is allocated by the government.

Conclusion and recommendation

The government has tried to give an alternative land for the people few times, but people haven't agreed because, though the lands were given, government hasn't promised to allocate money to build a new house. The thing was that if both land and houses are given by the government, they are willing to move anywhere. The government has no idea about a place to which the people should be brought. This research gives a formal and regular recommendation land for this burning problem. The people do not like to be settled anywhere without a house, therefore, the government should allocate houses in the new place with other social physical facilities.

Key word: Flood, Rainy Season, Overflowing, stream, GIS

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Variations of drought hazard among small Wewa Agro-ecosystems in the North Central Province of Sri Lanka

Extended Abstract

WKNP Wijesinghe¹

Background

Drought is one of the most widespread natural hazards affecting human populations around the globe (Wilhite, 2000). Drought is different from the rapid-onset environmental hazard because droughts develop slowly and have a prolonged existence, sometimes over several years (Smith, 2004). Drought can be simply defined as a situation where human demand for water exceeds the available supply (Wanninayake, 2011). or lack of expected rainfall. However

r, severity a drought depending on many factors such as degree of the deficiency, the time period, and the size of the area affected. In addition, timing is also a significant factor with the duration of drought affected. Drought creates many issues on the livelihoods of the people particularly among the rural communities. A small wewa system is a network of inter-connected cascading man-made water reservoirs, built in the drought-prone areas, in order to provide water all year round.

Objectives

There are micro scale variations in natural and societal environment of small Wewa agro-ecosystems in the North Central Province. Accordingly, level of drought hazard is expected to be different in various ecosystems. With this background, this study primarily aims to examine the heterogeneity of the drought hazard among the small Wewa Agro-ecosystems in the North Central Province.

Methodology

This study employed the constructive pragmatic approach facilitating drought management and analyses were performed using the data collected through an open ended questionnaire. The study was conducted with the samples of 540 covering eight Divisional Secretariat Divisions in the province. Perception data of the questionnaire were analyzed using Excel applications and presented as graphs, charts and tables.

Result

The data analyses reveal that within the province there is a huge variation in the level of drought hazard. Most of the respondents have expressed that they have not experienced any kind of drought in their environment. It can be concluded that those agro-ecosystems with minimal level of drought need further studies in order to introduce positive characteristics to other ecosystems. Perception of drought hazard is a physiological statement. Bellow chart shows the perception of drought hazard. According to the analyzed data, when considering the both indicators, it was found that the lowest level of drought hazard indicated in Kabithigollawa division and the highest level of drought hazard depicted in Mahavilachchiya DS division.

Table 1 Perception of the level of effect of drought

DS division	Horowpothana	Kabithigollawa	Mahavilachchiya	Padaviya	Pallugaswewa	Madawachchiya	Galenbindunuwewa	Tirappane
Drought is much relevant to us	4.1	3	4.4	3.3	3.9	3.9	3.6	3.5
Drought severely affect us	3.9	2.7	4.5	3	4.2	4.2	2.8	3.5

Source: Field data - 2016

Conclusions and Recommendations

The data analysis reveals that within the province there is a huge variation in the level of drought hazard. Small Wewa systems in Padaviya and Kabithigollawa divisions show the lowest level of drought hazard. Most of the respondents have expressed that they do not find any kind of drought in their environment. It can be recommended that those agro-ecosystems with lower level of drought need further studies in order to introduce positive characteristics to other ecosystems.

Key words: Socio economic effects, perception, adaptation, drought Management

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Identifying causes, impacts and mitigation measures of the landslide hazards: A case study in Kegalle district of Sri Lanka

Extended Abstract

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Background

Landslide hazard is one of the major natural hazards in Sri Lanka which has created many socio economic and environmental problems. Landslides, which were rare in the past but it has been increased after 2002 because it is evident that large number of events have been recorded in 2006 and 2007 (Senavirathne, 2007). During 1974 to 2007 period of Sri Lanka, 121684 of people have been affected for landslides, 815 of people have become death, and 11684 of houses have been damaged due to landslide hazards in Sri Lanka covering ten districts (DMC, 2009). According to report published by the Disaster Management Centre of Sri Lanka 2009, pointed out that occurring frequency of landslide hazard in Sri Lanka has been increased due to various reasons specially various human activities than natural factors. On the other hand, though landslide is considered as a natural hazard, frequency of occurring landslide has been accelerated due to various human activities in Sri Lanka such as illegal construction of houses, deforestation, lack of slopes management, poor management of water in hilly areas etc in this context, more research on landslide hazard is required to reduce the impacts of landslides in Sri Lanka. That is why this researched was conducted specially related to Kegalle district of Sri Lanka with the hope of identifying causes, impacts and mitigation measures.

Objective

The general objective of this research was to identify causes, impacts and mitigation measures of the landslide hazard in Sri Lanka. The specific objectives of this research were to identify causes of the landslides, to identify impacts of the landslides and to identify mitigation measures that can be used to minimize the impacts of the landslides.

Methodology

Both primary and secondary data were used for this study where key person interviews, filed observation used as primary data collection methods. Secondary data were collected using various books, journals and institutions in Kegalle district such as National Building Research Organization, Divisional Secretariat Office in Bullatkohupitiya. Data were analyzed quantitatively and qualitatively. Results were presented as texts, charts, graphs, maps.

Results

Landslides are occurred due to natural causes and man-made causes; Rainfall, hydrology, and geological formation such as slope angle, rock type, weathering of the rock, joint pattern, soil type, and land form are the underlying natural causes of landslides. Man-made causes are excavation of the slope or its toe, loading of the slope or its crest, Irrigation, Vegetation removal and draw down. There are many impacts of landslides which can be divided into three sectors such as environmental impacts, social impacts and economic impacts. Some of environmental impacts are soil erosion because 60% of top soil has been lost in the study area. Several floras were not able to grow due to the lack of soil and stability in the ground and great loss of vegetation and trees. Anxiety or depression, health problems such as epidemics, loss of human life, threats to public safety are some of social impacts. People may have to move from their residence into cities or from one city to another place when they are affected by landslide. It was able to identify many economic impacts such as losing money, Lossing business, damaged crops or livestock etc. Increasing vegetation cover, insurance methods, using correct land use methods, using correct engineered methods, retaining walls, hazard mapping systems, early warning system and rules and regulations are some of mitigation measures that can be used to reduce the impacts of landslides.

Conclusions and recommendation

Landslides are occurring in ten districts of Sri Lanka. Kegalle district is the one of the most vulnerable districts for landslides. Human activities have increased frequency of occurring landslides in Kegalle than the natural factors. High rainfall and removal of vegetation cover are the major reasons for occurring landslides. Both structural and non structural methods should be used to reduce the impacts.

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Key words: Landslide, Management, Mitigation measures, Deforestation, Environment.

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Sustainable ecotourism development: A case study in Oliyagankele forest reserve and Lenabatuwa reservoir in Kamburupitiya

Extended Abstract

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Senaratne

Background

Ecotourism is the “responsible travel to natural destinations that protects the environment and develops the well-being of local community” (Tisdell 2003). Natural resources, tropical climate, cultural and bio diversity have made ecotourism as a new trend of Sri Lanka. Economy of Matara district is mainly influenced by agriculture, fishing and tourism (Gamage et al. 2004).

Objectives

Though the potential of ecotourism is high in Sri Lanka, its actual level was not achieved. The objective of this research was to analyze the potential of sustainable ecotourism development in Oliyagankele forest reserve and Lenabatuwa reservoir in Kamburupitiya.

Methodology

Oliyagankele is a tropical rain forest which is located between Akuressa and Kamburupitiya in Matara district. Eighty local residents and 70 visitors were selected for the field survey through convenience sampling method. Questionnaires were prepared in English and then translated into Sinhala. Chi-square test, Wilcoxon signed rank test and multiple linear regression were used for the inferential analysis.

Results

There are number of endemic, rare and threatened species with 35 bird species, 220 plant species and 29 fish species including endangered species Rasbora Wilpita. Nearly 88 % of the local community have positive attitude towards sustainable ecotourism development. Their income has

significant association with the attitudes towards sustainable ecotourism ($\chi^2= 8.969$, $DF = 3$, $P\text{-Value} = 0.030$). Nearly 63 % of the local community is willing to participate in the sustainable ecotourism development. The study found that the ages ($\chi^2= 9.565$, $DF = 4$, $P\text{-Value} = 0.048$), level of education ($\chi^2= 6.839$, $DF = 2$, $P\text{-Value} = 0.033$) and level of income ($\chi^2= 12.000$, $DF = 4$, $P\text{-Value} = 0.017$) significantly affect their participation. Negative attitudes were received towards cultural modification, waste accumulation and resource depletion. Community has said that they need a proper waste management (38.75 %), proper pipeline water system (17.5 %) and proper awareness about sustainable ecotourism practices and its impacts (22.5 %).

It was noted that age and education are significant with visitors' willingness to pay ($WTP = 1.376 + 1.611 \text{ age} - 1.105 \text{ education}$). Rain forest environment was highest (45.7 %), followed by reservoir (37.1 %) in the visit motivations of visitors. Insufficient guides and map facilities (24.5 %), insufficient catering facilities (18.4 %), waste accumulation (16.3 %), accommodation facilities (14.3 %), insufficient medical centers (12.2 %), improper transportation (12.2 %) and climate (2 %) were their dislikes. Further, there is a significant potential for satisfactory level of visitors during their visit ($Z=6.634$, $P=0.0000$).

Conclusion

There is a very high ecotourism potential in the area in the community perspective include rain forest connected with Lenabatuwa reservoir, diverse species and endemic flora and fauna. Community has positive attitudes towards ecotourism activities. Majority is willing to participate in the ecotourism establishments. Almost half have said that rain forest environment was the motivation of their visit and there is a significant potential for satisfaction of visitors. However, insufficient guides, insufficient catering shops and improper waste disposal in the forest are some of the major challenges.

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Recommendations

Visitor centers and guides who are able to deliver information in English and other local languages are suggested. Brochures in those languages are also useful to offer more experiences. To attract more visitors, it is advised to organize exhibitions of wildlife. To create a mutual boundary among the community, authorities should occasionally discuss about ecotourism establishments with the local community. Thus, ecotourism can be successfully developed through the promotion and appropriate facility establishments with the support of local community.

Keywords: Ecotourism, Endangered spp, Local community, Oliyagankele forest reserve, Sustainability

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Importance of ecotourism in Sri Lanka: A case study of Mirissa

Extended Abstract

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Background

Ecotourism is defined as 'responsible travel to natural areas that conserves the environment, sustains the well-being of the local people involves interpretation and education'(TIES 2015; The International ecotourism society). Sri Lankan ecotourism is a growing niche the general tourism sector. It gives tourists the opportunity of enjoying multifaceted attractions such as the high mountains and the warm and broad sea beaches. In addition, they can also appreciate the co-existence of world's greatest religions (Buddhism, Hinduism, Christianity and Islam), magnificent traditions of glorious ancient civilizations such as artistic monuments and the incredible diversity of landscapes, climates, flora and fauna with unparalleled bio-diversity. Among them, the beach is the main focus which can be used for tourism. It is possible to use the 4R approach including the sun, sea, and hospitality all along the beaches particularly around Mirissa, Hikkaduwa, Jaffana.

Objectives

The main purpose of this study is to find about the tourism in Mirissa area and to understand how it happens. To understand why tourists are visiting this area increased significantly in recent times. In addition to find about the progressive change in life style of local persons who interact with tourists. This would pave the way to and identify the environmental, social economic and cultural significance growing eco-tourism.

Methodology

Collecting data for this was approached in two ways. They are divided as primary and secondary sources.

Under primary sources, a questionnaire survey was conducted with about 50 families in the study area along with 5in-depth interviews. Available official documents, publications and Web sources were used as secondary sources.

Results

When one examines information and data available at tourist development authorities it is clear that some 575,000 tourists have visited the Island in 2015. It has increased significantly around Mirissa area primarily due to the attraction for whale watching. It was found that nearly 70% of tourists who come to the Mirissa area are Europeans. In particular an increment of Russians (98%). About 80% percent of tourists come in groups and most of them are couples. Local residents say that most of tourists come to this area in December, January, and February. It was also found that some 58% of tourists prefer to enjoy sea food in beach side hotels. The boat fee for a sea safari is around Rs. 1000 and it has decreased recently. This is one of the reasons for increasing tourist arrivals. It is also reflected by the widening of facilities of them in Mirissa area. According to the legal requirement of tourism in Mirissa, a tourist should pay Rs. 5000 Government tax.

Conclusions & Recommendations

The study shows that tourism increases in Mirissa mainly during December, January, February months that mark the winter season in Europe. Most of tourists come to Mirissa beach to enjoy the beautiful beach and to see Whales. Seeing Whale is the main purpose of most tourists from European countries. Most of local residents earn money that also contributes to economic development in this area. It is suggested that use of tax revenues must be utilized for further development of tourism.

Keywords: Ecotourism, civilization, whale watching, taxes for development

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කිරලකැලේ තෙත් බිම් ආශ්‍රිත පාරිසරික සංචාරක කර්මාන්තයේ විභවතා

දීර්ඝ සාරාංශය

ඒ. එම්. නිමාලි දිනේෂා අත්තනායක²

හැඳින්වීම

මෑත කාලීනව සංචාරක කේෂ්ත්‍රයේ දියුණු වෙමින් පවතින අංශයක් ලෙස පාරිසරික සංචාරක ව්‍යාපාරය හෝ "විකල්ප සංචාරක ව්‍යාපාරය" කැපී පෙනෙන කේෂ්ත්‍රයක් බවට පත් වී ඇත. ඒ අනුව මූලික වශයෙන් අවධානයක් යොමු කළ යුතු කේෂ්ත්‍රයක් ලෙස සංචාරකයින්ගේ නිබඳ ඇස ගැටීමකට ලක් වන පාරිසරික පද්ධති හඳුනා ගත හැකි ය. තෙත් බිම් පරිසර පද්ධතිය ද මෙලෙස පාරිසරික සංචාරක කර්මාන්තය පාදක කරගත් පරිසර පද්ධතියක් ලෙස හඳුනාගත හැකි ය.

පෘථිවි ගෝලය තුළ භෞතික පරිසරයේ ජෛව විවිධත්වයෙන් සුපෝෂිත ජීවීන්ට සුවිශේෂී වාසභූමි සපයන, මිනිසාගේ සමාජ, ආර්ථික පරාමිතීන්ට වටිනාකම් රැසක් දායාද කරනු ලබන පාරිසරික පද්ධතියක් ලෙස තෙත් බිම් පරිසර පද්ධතිය හඳුනා ගත හැකි ය. මාතර නගරයට ආසන්නව ග්‍රාමසේවා වසම් 11ක හෙක්ටයාර් තුන්සියක් පමණ භූමි ප්‍රමාණයක් තුළ නිල්වලා ගං මෝයට කිලෝ මීටර් 6.4 දුරකින් ව්‍යාප්ත වී ඇති කිරලකැලේ තෙත්බිම් පරිසර පද්ධතියල දක්ෂිණ ශ්‍රී ලංකාවේ හෙලෝසින සමුද්‍ර විපර්යාස කාලවකවානුවට අයත් ජෛව විවිධත්වයකින් අනූන වගුරු බිමකි. (මනෝරි 2011) තෙත් බිම් පරිසර පද්ධතිය තුළ පවත්නා වූ සුවිශේෂී වැදගත්තමක් වනුයේ තෙත්බිම් ආශ්‍රිතව සම්පත්වල පවත්නා වූ විභවතාවයක් හඳුනා ගත හැකි වීමයි. ඒ තුළ මෙතෙක් ප්‍රයෝජනයට නොගත් එහෙත් ඵලදායීතාවයෙන් යුක්ත සම්පත් රාශියක් පැවතීම හේතුවෙන් එම තෙත්බිම් සංවර්ධනය අනාගත ඉලක්කය විභව සම්පත්වල පදනමයැයි පැවසිය හැකි ය. කිරල කැලේ තෙත් බිම් පරිසර පද්ධතිය පාරිසරික සංචාරක කර්මාන්තය කෙරෙහි විභවතාවයන් පවතින තෙත්බිම් පරිසර පද්ධතියක් ලෙස හඳුනා ගත හැකි ය.

අරමුණු

මෙම පර්යේෂණයෙහි ප්‍රධාන අරමුණ වන්නේ පාරිසරික සංචාරක කර්මාන්තය කෙරෙහි පවත්නා විභවතාව පරික්ෂා කිරීම සහ පාරිසරික සංචාරක කර්මාන්තය පවත්වාගෙන යාමට බලපෑ හැකි සංරෝධනා හඳුනා ගැනීමයි. කිරල කැලේ තෙත්බිම් පරිසර පද්ධතිය තුළ පවතින ජෛව විවිධත්වය සම්බන්ධ වර්තමාන සංවර්ධන සැලසුම් පරික්ෂා කිරීම හා ඒවායේ දුර්වලතා අධ්‍යයනය කිරීම යි, කිරල කැලේ තෙත් බිමෙහි පවතින කඩොලාන වෘක්ෂලතා ආදිය කෙරෙහි මිනිසාගේ බලපෑම කෙබඳු තත්ත්වයක පවතී ද යන්න අධ්‍යයනය කරමින් තිරසාර පරිසර සංචාරක කර්මාන්තයක් ලෙස

පෙන්නුම් කිරීමට යෝජනා ඉදිරිපත් කිරීම ආදිය සෙසු අරමුණු වේ.

ක්‍රමවේදය

කිරල කැලේ තෙත් බිම් පරිසර පද්ධතියේ පාරිසරික සංචාරක කර්මාන්තයේ පවතින්නා වූ විභවතාව පරික්ෂා කිරීම සහ ගැටලු අධ්‍යයනය කිරීමේදී ප්‍රාථමික මූලාශ්‍රය හා ද්විතීයික මූලාශ්‍රය පාදකකර ගන්නා ලදී. ප්‍රාථමික මූලාශ්‍රය ලෙස ව්‍යුහගත හා අර්ධ ව්‍යුහගත සම්මුඛ සාකච්ඡා මෙන්ම සෘජු නිරීක්ෂණය, ප්‍රශ්නාවලි ඉදිරිපත් කරමින් නිවැරදි දත්ත ලබා ගැනීම සිදුකරන ලදී. ද්විතීයික මූලාශ්‍රය ලෙස පාරිසරික පද්ධතිය හා බැඳුණු සංචාරක කර්මාන්තය පිළිබඳ ලියැවුණු පොත් සඟරා අන්තර්ජාල ආදිය මඟින් දත්ත සහ තොරතුරු එක් රැස් කර ඇත.

භූගෝලීය තොරතුරු පද්ධතියට අදාළ උපකරණය භාවිත කරමින් දත්ත විශ්ලේෂණය සිදු කරන ලදී. ඒ සඳහා පර්යේෂණයට අදාළ තිහගොඩ සහ මාතර ප්‍රාදේශීය ලේකම් කොට්ඨාස දෙකට අයත් තෙත් බිමට ආසන්න ග්‍රාම නිළධාරී වසම් එකොළහකින් වසම් පහක් තෝරා ගනිමින් දත්ත විශ්ලේෂණය සිදු කරන ලදී.

ප්‍රතිඵල සාකච්ඡාව

කිරල කැලේ තෙත්බිම තුළ කඩොලාන කිරල ශාක, ආක්‍රමණශීලී ශාක හා පක්ෂි විශේෂයන් හඳුනාගත හැකි ය. අද වන විට කිරල ශාක ව්‍යාප්තිය සීමිත ප්‍රදේශයකට සීමා වී තිබීම හඳුනාගත හැකි ප්‍රධානතම ම ගැටළුවකි. එසේම ඉඩම් ගොඩ කිරීම, දර ලබා ගැනීම සහ අපවිත්‍ර ද්‍රව්‍ය කිරල කැලේ තෙත් බිම් හරහා ප්‍රධාන ඇළ මාර්ගයට එක් වීම හේතුවෙන් තෙත් බිම් ජරදේශය දුෂිත ප්‍රදේශයක් බවට පත්ව ඇත. ලවණීකරණය වැඩි වීමෙන් ශාක වර්ග මෙන්ම ජලජ ජීවීන් ද මහා පරිමාණයෙන් විනාශ වී ඇත. නිල්වලා ගංවතුර වැළැක්වීමේ ව්‍යාපාරයෙන් පසුව මෙම ප්‍රදේශයේ ඉඩම් කැබලි කර ජනතාවට වගා කිරීමට ලබා දීම, ශාක ප්‍රජාව කපා විනාශ කිරීම, හොර මත්පැන් ජාවාරම්කරුවන් විසින් ගිනි තැබීම් නිසා ද ජෛව විවිධත්වයට හානි සිදු වී ඇත. 2016 කේෂ්ත්‍ර නිරීක්ෂණයට අනුව ආක්‍රමණශීලී ශාකයක් වූ ඇකේෂියා ගස් ව්‍යාප්තිය 6000² පමණ වේ. වැඩුණු පදුරු ශාක පත් වර්ග ඇතුළු ජලජ ශාක නිසා කිරල කැලේ මධ්‍ය ප්‍රදේශය ජලාශ්‍රිත පක්ෂීන්ට සහ සතුන්ට සුදුසු පරිසරයක් ලෙස පැවතුණි. නිල්වලා යෝජනා ක්‍රමය මුල් කරගෙන කිරල කැලේ තෙත්බිම හා ඒ ආශ්‍රිත වගා බිම් මේ වන විටත් කිසිදු කටයුත්තකට ගත නොහැකි තත්ත්වයකට පත්ව ඇත (මනෝරි 2010). පාරිසරික සංචාරක කර්මාන්තයට සුදුසු විභවතාවන් එම ස්ථානයේ පවතින බවට එමඟින් තහවුරු වී ඇත. ඔවුන්ගේ අපේක්ෂාව වනුයේ තෙත්බිමේ භූමියෙහි ජලය යනාදිය ප්‍රයෝජනයට ගෙන පාරිසරික සංචාරක ව්‍යාපාරය තුළ අලෙවිකරණය සඳහා ඉඩ ලබා ගැනීමයි. ඒ සඳහා පරිසර හිතකාමී සංචාරක කර්මාන්ත යෙදවීම මඟින් අපේක්ෂිත අරමුණු කරා පහසුවෙන් ළඟා විය හැකි ය. නමුත් ඒ සඳහා රේඛීය ආයතන අතර පවතින සබඳතාව බිඳවැටී තිබේ.

² භූගෝල විද්‍යා අධ්‍යයනාංශය රුහුණ විශ්ව විද්‍යාලය මාතර ශ්‍රී ලංකාව .

සාරාංශය

මෙම කේෂ්ත්‍ර නිරීක්ෂණයෙන් සිදු කරන ලද අධ්‍යයනයේ ප්‍රතිඵලවලට අනුව ඵලදායී හැකි නිගමනය වන්නේ මාතර නගර සංවර්ධන ව්‍යාපෘතිය යටතේ පාරසරික නිකේතයක් ලෙස කිරල කැලේ තෙත්බිම් විවිධ ව්‍යාපෘති සඳහා යොමු කර තිබුණ ද එකී සියලුම ව්‍යාපෘති අසාර්ථක සැලසුම් ලෙස පවතී. නමුත් මධ්‍යස්ථ සම්පත් විභවතාවයන් පවතින කිරල කැලේ තෙත්බිම් මනා සැලසුම්කරණයක් සිදුකර ප්‍රදේශවාසීන් ද දැනුවත් කිරීමෙන් පාරසරික සංචාරක කර්මාන්තය පවත්වා ගෙන යාමට හැකි බව මෙම පර්යේෂණයෙන් තහවුරු වේ. මෙහිදී ඉදිරිපත් කළ හැකි යෝජනා ලෙස තෙත්බිම් හා සම්බන්ධිත පාරසරික සංචාරක කර්මාන්තය පිළිබඳ දැනුම අනාගත පරපුරට දයාද කිරීමට අවශ්‍ය ක්‍රමවේද සකස් කිරීම කළ යුතු වේ. පාරසරික සංචාරක කර්මාන්තය සැලසුම් සහගත කිරල කැලේ තෙත්බිම් පරිසර පද්ධතියට හානි නොවන පරිදි සංවර්ධනය කළ යුතු වේ.

මූලාශ්‍ර

කිරල කැලේ, පරිසරය, සංචාරක කර්මාන්තය, තෙත්බිම්, ජෛව විවිධත්වය

ආශ්‍රිත ග්‍රන්ථ

බන්දු. අ. පී., 1993, ජූලි, අඩක් දත් අය නිසා සහමුලින් ම වැනසී යන දකුණු පළාතේ කලපු, විදුසර විද්‍යා සඟරාව, උපාලි ප්‍රවෘත්ති පත්‍ර සමාගම.

සබරගමු විශ්වවිද්‍යාලයීය ශාස්ත්‍රීය සංග්‍රහය, සබරගමුව විශ්ව විද්‍යාලය, බෙලිහුල්ලිය, 2011.

හේවගේ, ධම්මික 2008, නිල්වලා ගඟ ආශ්‍රිත ජනග්‍රාහි, මාතර වංශය, කොළඹ, සංස්කෘතික කටයුතු හා ජාතික උරුමයන් පිළිබඳ අමාත්‍යාංශය.

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Environmental impacts of tourism in the Habarana area

Extended Abstract

WWAL Warnasooriya¹

Background

An environmental impact of tourism on a global scale has become more evident due to increasing air travel and the use of vehicles for overland travel. Tourism also contributes to the increasing sources of greenhouse gas emissions, biodiversity loss resulting from habitat loss (Briassoulis, 2000). It leads to increased consumption of resource and degradation of various types of environmental conditions. Increased pollution, discharges into the sea, increased pressure on endangered species and heightened vulnerability to forest fires also results from accelerated tourism. It often puts a strain on water resources and can force local populations to compete for the use of critical resources. Many of these impacts are linked with the construction of general infrastructures such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas. Negative impacts from tourism occur when the level of visitor use is greater than the environment's ability to cope with this use within acceptable limits of change (Sanlu, 2003). The negative impacts of unplanned tourism development can gradually destroy environmental resources on which it depends.

Objectives

Habarana area is one of the important tourism places in Sri Lanka which has a greater impact on local economy and environmental quality. In this study, the main objective is to examine environmental pollution of tourism. It focuses on the negative impacts on the environment and human settlement of local communities.

Methodology

Required data and information related to environmental impacts of tourism have been collected from the primary and secondary sources. A sampling method has been used to collect primary data through a questionnaire survey. This sample was confined to three field observation sites and interviews were conducted with hotel employees and villagers. Secondary data have been collected using various published research papers

environmental related books magazines, articles, and newspapers. Official records were available and web sources have also been utilized.

Results

At present, nature tourism is closely linked to biodiversity and the attractions offered by a rich and varied environment. Unplanned tourism can also cause loss of biodiversity when land and resources are strained by excessive use, and when impacts on vegetation, wildlife, and water resources exceed the carrying capacity. This loss of biodiversity, in fact, means loss of tourism potential. Major environmental impacts of tourism in Habarana area include water pollution, soil pollution, noise pollution, air pollution and socio-economic impacts. According to our field observations, the adjoining reservoirs were affected and water discolored. The people believe some institutes dispose of wastes directly into the Lakeland they think water is not in suitable quality for using in daily activities. Many tourists come to this area daily. Due to this reason, many vehicles are coming to this area creating much noise and smoke affecting air quality.

Conclusion and Recommendation

Natural beauty and local resources of Habarana town and its environs are being destroyed day by day due to enhanced tourism and the environment is polluted rapidly due to the irresponsible acts of some tourists. Available rules and regulations to protect the environment in Habarana area must be enforced. People should suggest to relevant authorities to apply the 'polluter pays principle' strictly and identify an appropriate environmental management system for the area.

Keywords: Environmental impacts, Tourism, Pollution, Rules and regulations, Environmental management system

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Energy efficiency and energy conservation: A case study in Rajarata University of Sri Lanka

Extended Abstract

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Background

Over the past two decades, the higher education sector has focused on environmental conservation and sustainable development. This has been driven not only for the environmental movements, but by the cost savings, public relations and legal compliance. Over the same period, energy conservation has been raised by a wide range of organizations in the service sector and public bodies. Energy conservation means making an effort to reduce the consumption of natural energy sources like electricity, water etc. people depend on energy for almost everything in their lives, for comfortable life, for productive and for enjoy. It is always seen that there exist a gap between generation of energy and demand of energy (Biswajit, 2013). Energy is an exhaust resource. If people do not conserve energy, people will have nothing to use. Also, energy conservation is also important when it comes to climate change. Currently, erratic climates and climatic changes are the greatest threats that we are facing. In order to ensure the sustainability of energy supply and subsequently of the country's sustainable economic development, the government has to intensify further the implementation of energy efficiency programs (Oyedepo, 2012). Faculty of Social Sciences and Humanities of Rajarata University of Sri Lanka was selected to study and make some recommendations to enhance the energy efficiency and energy conservation through examining the attitudes towards the energy conservation among the students of the Faculty.

Objectives

Overall aim of study was to make some recommendations for enhancing the energy efficiency and energy conservation of Rajarata University of Sri Lanka. Specific objectives were to find out the present situation (what are the

activities, strategies, policies, and infrastructures on conservation energy), to find the level of awareness on energy conservation of students and staff of faculty and to introduce some alternative measures to conserve energy.

Methodology

This research used primary data and secondary data. Primary data was the most important data for the study. A questionnaire based survey was conducted with a random sample of 50 students to collect primary data. Interviews and discussions also used as methods for collecting primary data. To collect data interviewed a senior lecturer and electrical supervisor of the Rajarata University. To get secondary data used internet sources, previous research papers and books.

Results

According to research, for energy efficiency and for energy conservation gender of the respondent was not an important factor. According to the analysis, 68% students were aware about 10 to 5 measures to conserve the energy hence enhance energy efficiency. It is a favorable condition. 62% students used to conserve energy as a cost saving method. Study also found that only 25% students conserve energy because of environmental reasons. Also among the students, 84% students were with the idea that there is no proper dialogue among the students over the energy conservation. 85% students are like to participate some awareness programs and for some activities.

Conclusion and recommendation

There are two ways to reduce the use of energy. They are quick actions and installing some equipment for long term benefits. Quick actions depend on behaviors. As examples turning things off, replace LED bulbs, maintain and Change the way of using AC. Installing things for long term benefits means use solar power, use sun shades for windows, awareness program and Use Green curtains / climbing plants etc.

By using these measures, energy consumption, can be reduce. Enhance the efficiency of energy use, Reduce environmental pollution and enhance the quality of University.

Keywords: energy, electricity, conservation, efficiency, Faculty

¹ Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale, Sri Lanka.

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The need of an eco – innovative approach for poultry farming in North Western Province of Sri Lanka

Extended Abstract

EAC Dilrukshi¹, MDMM Jayarathne, WHPP
Weweliyadda, DM Jayasena

Background

Poultry is recognized as one of the important segments in animal husbandry because poultry keeping has been practiced for centuries as a backyard operation among rural families. In Sri Lanka, rural poultry can be promoted as a powerful tool for rural development programs. There was only one chicken processing company in Sri Lanka two decades ago, but with the rising demand for poultry products, several large scale processing companies entered the business. When it comes to 2015, this has spread throughout the country as small scale, medium scale and large scale. At present, the highest number of poultry farms can be seen in the North Western Province and it covers about 75% of egg and meat production in the country (Ratnayake , 2014). Hence, it has become one of the major and significant industries in the province.

Objectives

This is an industry which delivers high negative environmental impacts. Therefore, it is succinct that there should be well-defined methods in order to identify and manage those impacts effectively. Consequently, the objectives of this study were to determine the environmental aspects and impacts of the industry by scrutinizing the current production process and to propose approaches and measures in order to minimize them.

Methodology

The study has used the case study approach to collect the required data which was followed by selecting five medium scale poultry farms in the North Western Province and the investigations were done through interviews and observations. The detailed process identified for the egg and meat production is given in the process flow diagram in Figure 1.

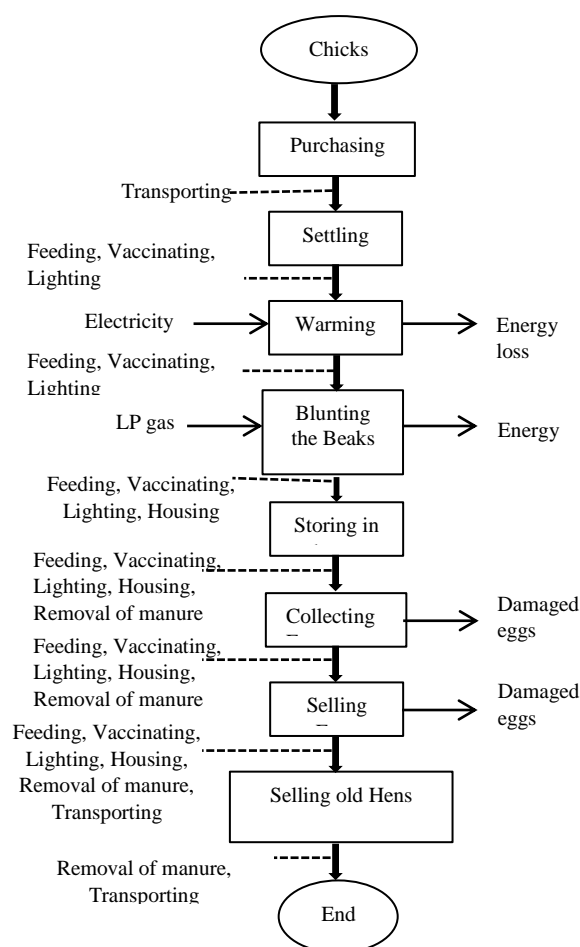


Figure 1: Egg Production Process

The study has delineated and substantiated the current environmental impacts along the process and pertain methods have been identified to lessen those impacts.

Results

The observations have determined the following significant problems in the industry:

- Improper mechanism of waste disposal and the bad odour that may result in land and air pollution.
- Spread of diseases
- Poor hygiene of the shelters
- Improper use of poultry manure
- High energy and water consumption
- Poor personal hygiene of workers

Finally, an eco-innovative framework has been suggested. It includes some proactive and reactive

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methods to overcome the major environmental impacts of the industry. The methods include;

- Proper waste disposal and waste optimization
- Effective shelter building to prevent bad odour
- Agro-lamping to prevent resource depletion (Good Practices in Small Scale Poultry Production – A manual for trainers and producers in East Africa)
- Using alternative energy sources such as bio gas
- Use of hydro power AC generators to egg cooling rooms
- Use of LED bulbs for heat generation
- Use of secondary containers to reduce water wastage
- Regular training programs to educate farm workers on bio-security, vaccination and handling of birds

Conclusions and Recommendations

Poultry is a major industry in the animal husbandry. Hence, the environmental aspects and impacts in this industry should be given priority. But at present, although there are some basic rules and regulations used by Central Environmental Authority, they are not of great concern. Hence, it is really important to look into these impacts and take immediate actions.

Therefore, implementation of eco- friendly and eco- innovative approaches in order to minimize the environmental impacts is advocated in this study.

Moreover, some of these methods can be implemented in other livestock industries such as dairy, goat and swine in order to reduce the impacts to the environment.

A further analysis can be done after implementing this framework in the farms. It would help to ensure whether this mechanism could generate reliable results.

Keywords: Eco-Innovative approach, Environmental impacts, Poultry farming, Process flow, North western province

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Contributory factors of cultivating traditional food crop varieties by farmers: A case study in Moragollagama agrarian service division

Extended Abstract

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Background

The multiple benefits associated with the traditional crop varieties have escalated the demand both national and international levels. For instance, it is evident the significant role played by traditional crop varieties in assuring both food and income security in rural communities, accompanying numerous nutritional and medicinal benefits (Dansie et al., 2012). Accordingly, the promotion of traditional crop varieties across the country is declared as a major trust area under the existing agricultural policy in Sri Lanka to make use the benefits for the development process. However, the shortage of production is expanding irrespective of the higher market price, promotional activities and growing preference of the farming communities, highlighting the low level of progress in the system.

Objectives

The agro-biodiversity associated with the combination of traditional and commercial crop varieties leads to sustainable agriculture. In order to fulfill the growing demand, it is timely and nationally important to popularize the cultivation of traditional crop varieties throughout the country. Thus, the determination of contributory factors to cultivate traditional crop varieties by farmers is vital in this regard. Moreover, the present study examines the socio economic factors affecting on cultivation of traditional crop varieties and factors, which determine the selection of crop mix by the farmers.

Methodology

The Moragollagama Agrarian service division, which is having the highest number of traditional crop growers in the Kurunegala district, was purposively selected as the study area. A structured pre-tested questionnaire was used to collect data from randomly selected 100 farmers inclusive of 41

traditional crop cultivators. The socio economic factors affecting on cultivation of traditional crop varieties were determined by using binary logistic regression analysis, while the frequency analysis technique was used to detect the factors determine the type of crop.

Results

The binary logistic regression disclosed that the education level of the farmers has a negative significant effect ($p = 0.016$) in determining the cultivation of traditional crops. Moreover, this finding was confirmed by Zivanomoyo and Mukarati (2013). Accordingly, farmers who are more educated tend to practice more inorganic based farming systems with improved crop varieties rather using traditional crop varieties. Moreover, these findings emphasized the need of attitudinal change in order to promote traditional cropping systems. On the contrary, farming experience, age of the farmer, household size and annual income was not affected significantly (Table 1). As the majority of the farmers used to practice highland cultivation under rain-fed condition, the priority may be given to the adoptability of crops to the water - scare condition (Chivenge et al., 2015) and this would be the major determinant in cultivation of traditional crops.

Table 1. Results of the Binary Logistic Regression

Predictor variable	Estimates	P Value	SE estimates
Experience	0.03071	0.575	0.054
Age	-0.03247	0.516	0.049
Household size	-0.41041	0.135	0.274
Education level	-1.69851	0.016	0.707
Annual income	0.0000009	0.642	0.000002

According to the results of the frequency analysis, higher market demand (85%) (Bandula et al., 2016), lack of inorganic fertilizer and chemical usage (82%) (Chivenge et al., 2015), availability and cost of seeds (78%), shelf life of harvested products (75%) and cultivable land extent (75%) (Zivanomoyo and Mukarati, 2013) were the major factors which determined the type of traditional crop varieties. However, the nutritional level of crops (22%) was not satisfactorily considered by farmers in selecting the type of crop. Furthermore, this may be due to lack of consideration on

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nutritional value of the product in setting the market price in the domestic level.

Conclusion and Recommendations

In the process of promoting traditional food crop varieties, a major role can be played by rain-fed farmers who do not adopt intensive inorganic agronomic practices such as excessive usage of fertilizer and agro-chemicals. Also, the government has to play a major role in the fields of extension, marketing and research in order to uplift the neglected rain-fed farming system. Additionally, seed production programs should be introduced to minimize the existing seed shortage of traditional crop varieties.

Keywords; Moragollagama, Contributory factors, traditional food crop, traditional crop

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Effect of Neem extracts for controlling flea beetle (*Phyllotretacruciferae*) in radish (*Raphanussativus*)

Extended Abstract

MMS Jayathilaka¹, RDN Debarawatta, SJBA Jayasekera

Background

Radish (*Raphanussativus*) which belongs to family Brassicaceae is a popular root vegetable grown in Sri Lanka throughout the year. It can be successfully grown in both tropical and temperate regions. Radish is rich in vitamin A, B, and C. In Sri Lanka during 2013/2014 *Maha* season the extent of radish cultivation was 1,122 ha and the production was 10,446 Mt. Flea beetle (*Phyllotretacruciferae*) is the most common and destructive pest of radish (Bohinc and Trdan, 2012). Adult *Phyllotretacruciferae* feeds on cotyledons and developing leaves and stems of seedlings, leading to loss of photosynthetic capability and it leads to plant death (Tangtrakulwanichet *et al.*, 2014).

Application of broad spectrum insecticides is one of the control measures of *Phyllotretacruciferae* by farmers. However, there is a chance of consuming the chemical residues within the crop when the inorganic pesticide application is done to control the pest. Therefore application of organic pesticides would be suggested as an important ecofriendly pest management method for radish. Variety of Neem based products are used as insecticides, pesticides, fumigants, and fertilizers etc. Further, neem can be more economically viable pest controlling method for family brassicaceae crops.

Objective

The objective of this study was conducted to investigate the effect of different Neem based pesticides to manage *P. cruciferae* population in *R. sativus*.

Materials and Methods

Experimental Site

The experiment was carried out at the Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka. The experiment was carried out from January to April 2016.

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Crop Establishment and Maintenance

Land was ploughed to 30-40 cm depth. Fifteen raised beds (2×2 m) were prepared and before sowing the seeds organic and inorganic fertilizers were incorporated according to the recommendations of the Department of the Agriculture. Thinning out was done twenty days after seed sowing.

Preparation of Neem Pesticides

Neem Seed Extract

Neem seeds (50 g) were taken and seed coat was removed. Seeds were pounded gently without coming the oil to outside. Neem seed powder was gathered in a muslin pouch and soaked three days in 750 mL of water. The pouch was squeezed and the extract was filtered. The filtered volume was up to 1000 mL. Soap was added as an emulsifier. (1 mL of emu. / 1 L of water; Sridhar and Vijayalakshmi, 2002).

Neem Leaf Extract

Neem leaves (200 g) were taken and soaked three days in 750 mL of water. Water soaked leaves were grounded and the extract was filtered and volume up to 1000 mL. Soap water was added as an emulsifier. (1 mL of emu./ 1 L of water; Sridhar and Vijayalakshmi, 2002).

Treatment Application

Two Neem based pesticides with control were applied as treatments at 5 day intervals. Treatments were T₁- Neem Seed Extract, T₂ - Neem Leaf Extract and T₃ - Control (Tap water).

Data Recording and Data Analysis

Before and after applying the Neem pesticides, damage severity was detected in 50 randomly selected plants from each treatment. Further, leaf length, leaf fresh weight, leaf dry weight, tuber length, tuber diameter, tuber fresh weight and tuber dry weight were collected from twenty randomly selected plants from each treatment in each replicate. The data obtained from experiment was statistically analyzed using Minitab 16 software and mean separation was done using turkey t test. The damage severity was statistically analyzed by Kruskal – Wallis test using Minitab 16 software. Cost for Neem extract preparation per hectare was calculated.

Results and Discussion

According to the results, no significant differences were observed between and T₁ and T₂ in tuber length, diameter, fresh weight and dry weight while, there was a significant difference T₁, T₂ with control. Further, the highest tuber fresh weight, dry weight and diameter were recorded in Neem seed extract treated plants (Table 1). Further, there were no significant differences were observed in T₁ and T₂ of leaf length, leaf fresh weight and leaf dry

Cost Analysis

According to the cost analysis, cost for Neem seed extract was higher than the leaf extract (Table 2).

Conclusions

Neem seed extract can be used to manage scales, thrips, whiteflies and mealy bugs organically than the Neem leaf extract. Though both Neemseed and leaf extracts are effective in managing flea beetle

Table 1. Yield parameters of tubers, leaves and damage severity of tested pesticides

TRT	Yield parameters of tubers			
	LEN (cm)	DIA (mm)	FWT (g/plant)	DWT (g/plant)
T 1	12.5 ^a	16.1 ^a	23.2 ^a	1.5 ^a
T 2	11.1 ^{ab}	15.1 ^a	19.1 ^a	1.3 ^a
T 3	9.2 ^b	8.5 ^b	6.8 ^b	0.5 ^b
R-Sq	7.9	16.9	15.9	11.5
P Value	-	-	-	-

Yield parameters of leaves			Damage Severity	
LEN (cm)	FWT (g/plant)	DWT (g/plant)	Median	Average Rank
21.3 ^a	30.6 ^a	3.4 ^a	0.000	52.4
19.8 ^a	26.8 ^a	2.7 ^a	0.000	62.8
13.7 ^b	13.1 ^b	1.0 ^b	1.000	111.3
34.8	17.5	29.5	-	-
-	-	-	0.000	-

Keywords: Neem leaf extract, Neem seed extract, *Phyllotretacruciferae*, *Raphanussativus*

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weight while, the highest leaf fresh weight and dry weight and length were recorded in Neem seed extract treated plants (Table 1).

Significant difference was observed in damage severity among the treatments (0.05 > P). According to the median values both seed extract (T₁) and the leaf extract (T₂) can be used to manage flea beetle population when compared with the control (T₃). But, T₁ recorded the lowest average rank. (Table 1).

in radish, Neem seed extract recorded less damage over Neem leaf extract. Although the cost for preparation of Neem seed extract is higher, it can be used to manage flea beetle successfully. Therefore, farmers are advisable to use Neem seed extract in managing flea beetle in radish as an environmental friendly management method.

Means in a column with same letters are not significantly different at 0.05 level. TRT- Treatment, LEN- Length, DIA- Diameter, FWT- Fresh weight, DWT- Dry weight, T₁- Neem seed extract, T₂- Neem leaf extract, T₃- Control (Tap water), Significantly different at the p < 0.05 level.

Table 2. Cost analysis for extracts

Ingredient	Rate (kg/ha)	Cost/ha (Rs.)
Neem seeds	20	4000.00
Neem leaves	30	0000.00

Sridhar, S. and Vijayalakshmi, K. (2002). *Neem: A user's manual*. CIKS, Chennai, 24-25.

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Developing nominal threshold levels for *Phyllotretacruciferae* (Coleoptera : Chrysomelidae) damage on canola in Montana, USA. *Journal of Crop Protection*, **66**, 8 – 13.

Soil erosion in unsystematic irrigation of vegetable fields in Welimada area

Extended Abstract

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Dissanayake

Background

Soil erosion is a one of the most considerable burning environmental problem in the world. The agents of soil erosion are water and wind. The loss of soil from farmland may be reflected in reduced crop production potential, lower surface water quality, and damaged drainage networks. (Krishnarajah, 1998). Soil erosion is of particular concern in the hill country where the watersheds of major rivers are located. The most important catchment i.e. the upper Mahaweli catchment (UMC) Consists of 3118 so. Km (Nayakakorala, 1996) Most of the people in Welimada area are farmers and grow vegetables. The crops are planted on a bed of about 1 to 1.5 a wide separated by furrows or ditches. Water is sent in the furrow / ditch and splashed on the bed while water is flowing in the ditch using a plate. Water splashed onto beds wash off the soil on beds and added to the flowing water in the furrow/ditch. Uma Oya is the major water source in this area and it had been polluted due to inappropriate irrigation methods of the farm lands. A conspicuous observation is the brownish color water running in the Uma Oya. (Tributary of Mahaweli River) which flows through Welimada area throughout the year, irrespective of rains. Uma Oya feeds the Rantambe reservoir.

Objectives

The general objective was to identify soil erosion of unsystematic vegetable fields in Welimada area. And specific objectives are to find out reasons and social, economic and Environmental effects of soil erosion. And study how Uma Oya important to the people and effects of pollution. Another objective of the research is to find out soil conservation methods and propose soil conservation methods.

Methodology

Both primary and secondary data used for the information collection. Primary data collected from

questionnaires, field surveys, interviews, and discussion. 50 questionnaires used for the research and selected participants by randomly. Focus group discussions were used for gathering data. Books, Articles, Newspapers, Journals, Internet were used as secondary data collection. Data were analyzed by Excel and presented by graphs, charts tables and statistics.

Results and Discussion

This research was mainly discussed impacts of soil erosion and soil conservation. Reduced water quality, destroy soil quality, reduced soil fertility, damage to ecosystems such as aquatic animals (endemic and endangered) and small organisms in the top soil layer are the environmental impacts of soil erosion. In the small land, they used the high capacity of primary irrigation systems. Using notice boards, banners, posters, stone bunds, Hampshire, contours drains, drip feed system and empower laws and regulations, organized awareness programs are very important to the soil conservation in the area. Then, according to the research 30% of farmers used some soil conservation technology in their farm land. 70% of farmers didn't use any soil conservation methods due to lack of knowledge of soil conservation in vegetable lands. 70% of interviewers like to apply soil conservation technology to their farmlands, but, lack of money is the main problem for using soil conservation technology.

Conclusion and Recommendations

Unsystematic irrigation systems of vegetable lands are the major reason for soil erosion. Primary soil conservation, using technology and rules and regulations are mostly important to soil conservation. Government and other organization should pay attention about provide subsidies to farmers. Most of the poor farmers didn't refer to soil conservation techniques. Because those are very expensive and maintain cost is a high and providing subsidy also very important to soil conservation in this area. And also according this research people like to use that soil conservation method if the government or Ngo provide subsidies for them. Most of the farmers were uneducated and providing awareness programs also very important. Then it is timely important to encourage farmers for soil conservation in the well-made area to protect hill country and clean water sources in Sri Lanka.

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Keywords: Soil erosion, Water quality, Conservation, Ditch, Irrigation

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Reduction of paddy cultivation: A case study in Alawwa area in Kurunegala district

Extended Abstract

PMPK Pathirana¹, LMAP Gunawardhana

Background

The beginning of the paddy cultivation in Sri Lanka had proud history and it traces back to more than 5000 years (Dharmasena, 2010). Our culture was adjoined with the paddy cultivation. The royal governance mind saw the Sri Lanka was enrich with the rice farming. Sri Lanka produces just over million tonnes of rice each year. Rice is harvested twice a year. About 1.8 million farm families are engaged in paddy Cultivation Island wide. Anuradhapura, Pollonnaruwa and Ampara are the districts which produce highest rice production in Sri Lanka which contribute 12%, 12%, 11% in respectively. But forth highest district of paddy in Sri Lanka is Kurunegala which contribute 10 % out of total paddy production of Sri Lanka (Department of Census and Statistics of Sri Lanka, 2015). It is noted that there is a long term trend between the rainfall and the deviation from the rice production. Rice is considered as golden grain and it produce staple food in Sri Lanka. But at present, paddy production is decreasing due to various natural and economic factors. Therefore, there are so many challenges to protect this cultivation in Sri Lanka.

Objectives

The general objective of this study was to study reduction of paddy cultivation in Alawwa area in Kurunegala District. The specific objectives were to identify the reduction of paddy lands and paddy production in Alawwa area, to identify factors which affect to the reduction of paddy cultivation, to suggest potential measures to increase of paddy production.

Methodology

Both primary and secondary data were used for this study. Questionnaires, group discussions, filed observations methods were used for collecting primary data. Books, website in internet, reports and articles were used to collect secondary data. Both quantitative and qualitative methods were adapted to analyse the data. Data were presented using texts, graphs, charts, maps, tables. There

were 200 farm families in Keppitiwalana GN Division. Questionnaires administered to 35 farmers. Study was conducted in Alawwa, Keppitiwalana GN Divisions.

Results

The multiple analyses indicate that there is a significant reduction of both paddy production and paddy lands in Alawwa area. Researcher could find out several reasons for reduction of paddy production in this area such as lack of high quality paddy seeds, lack of water for paddy cultivation, lack of suitable lands, changed of the paddy growing season, lack of knowledge of the farmers, lack of good price for paddy in the market, Loss of profit from the paddy crops, increase cost for paddy cultivation etc. Most people refer other crops instead of paddy cultivation In Keppitiwalana GN division. There are 140 acres of paddy fields in Keppitiwalana including four villages but only harvested 97 acres of paddy fields in present while 43 paddy fields have been become fallowed during the period of 2010-2015. Though the highest harvest of paddy has been reported in 2011, after 2011 paddy production has been reducing immensely in this area. Farmers in this area are changing to grow other crops instead of paddy because of various reasons such as continuous drought. On the other hand, they think that growing long term crops such as coconuts, and other commercial crops like pineapple, and other vegetables are profitable than paddy. Therefore, there is a potential threat for reducing paddy cultivation in Alawwa area. There are limited paddy lands in this area but day by day quantity of paddy land is decreasing due to landfilling for various constructions such as building houses, factories due to the increase of human population in this area. Hence, it is necessary to take some policy based actions to minimize the land filling for other purposes in order to sustain paddy cultivation in Alawwa area.

Conclusions and Recommendations

Since the past era paddy cultivation was main crop in Sri Lanka. Furthermore paddy cultivation is reducing day by day and it may be threaten to economy of Sri Lanka. In Keppitiwalana area most of farmers engaged long term cultivations. Farmers have not enough economically benefits from paddy cultivation. They had high income from the long term cultivations than paddy. They are growing other crops instead of paddy cultivation. Some farmers had been given up paddy cultivation since long period. Agrarian Department and relevant

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parties should motivate farmers to uplift paddy cultivation in order to protect the staple food of Sri Lanka.

Keywords: Paddy cultivation, paddy Reduction, Fallow field, Staple food.

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Environmental pollution in Badagamuwa forest reserve in Kurunegala

Extended Abstract

TDHC Kulasiri¹

Background

Badagamuwa forest is located 4km away from the capital city of Kurunegala bordering Dambulla Kurunegala highway (Jayarathne, 2007). The trees covered more than 30 hectares. This reserve of more than 200 hectares was started in 1925 and has unique biodiversity. Badagamuwa forest reserve is well known for its natural beauty but unfortunately, the forest is going into the hand of destruction. Environmental pollution is including air and water pollution, global warming, energy, solid and hazardous waste, and pollution at home (Marquita, n.d.). There are several reasons for this issue. The local tourists are not provided a proper place to have their meals. So, as a result, the village's people have constructed some small shops beside the roads of the forest. The tourists have practiced taking the meals for these shops and the wastes such as polyethylene, plastic are thrown away to the environment. Although there are so many negative after effects still the authorities have not taken any considerable action for this. They can construct resort center where the local people can rest and walk through the forest. And also, if the shop owners are given a proper place to sell their goods and to engage their business. Most importantly environmental authority, forest department must pay attention from this problem. This long issue can be the result of the total destruction of the forest. So, it is the responsible of the authority to take necessary steps and to protect the forest for the future.

Objectives

The general objective of this study was to identify the main causes affected to the environmental pollution in Badagamuwa forest. Specific objectives of this research were to study about the importance of Badagamuwa forest, identify the main human causes affected to the environmental pollution and identify the new plans and

suggestions to protect forest reserve for future generation.

Methodology

This study was carried out based on primary and secondary data. Primary data were collected from shop owners and villages near the Badagamuwa forest. A questionnaire survey was conducted with a random sample of 30 households to collect primary data. The secondary data was from books, magazines, newspapers, articles, leaflets and internet. Graphs, charts, and tables in Excel were used to analyse the data.

Results

Environmental pollution is one of the big problems in the world. In this research, it was able to identify environmental pollution besides the Badagamuwa forest. There were no garbage pits beside the forest. Municipal Council dispose garbage near the Kowana village. There is a huge bad smell around the village area. People complained about the problem and they were health problems. Numbers of people suggested proper disposal methods were suitable for minimizing environmental pollution in Badagamuwa forest and the government should be paying attention to developing facilities.

Conclusion and Recommendation

Badagamuwa forest reserve owns a great biodiversity. But the improper management of garbage is becoming a major threat to the forest. The environment has got polluted as a result of the improper disposal of garbage. The trees are also been destroyed. The authorities like Department of forest concervation, Central Environmental Authority have not still taken necessary steps. They are only pretending their responsibilities. As a result, have to consider this issue. The researcher identified following recommendations was suitable for sustainability of Badagamuwa forest placing safe garbage pits, making the forest a place suitable for people, making the people aware of the forest, developing the sanitary facilities, taking necessary steps to manage the shops around the forest and recycling the garbage

Keywords: destruction, garbage, authorities, minimize, forest

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Destruction of mangroves in Chilaw Lagoon

Extended Abstract

DDY Peiris¹, PSK Rajapakshe

Background

Mangroves are a group of plant communities that occur in the coastal intertidal zones of tropics and sub-tropics and hence of great ecological and environmental significance. They form one of the world's dominant coastal eco-systems uniquely adapted to marine and estuarine tidal conditions. In Sri Lanka, as in many other countries, conversion of mangrove forests to other uses has resulted in a considerable decline of these ecosystems. Mangrove ecosystems play a vital role in ecosystem functions and also extensive economic and non-economic contributions to mankind (Karunathilake, 2003). It is estimated that mangroves in Sri Lanka cover only 87 km², which amounts to around 0.2% of the total land area of the country. The reduction of mangrove ecosystems in Sri Lanka is largely caused by the increasing non-sustainable human activities in and around the mangrove habitats (Kaleel, 2013).

Objectives

The study focuses mainly on mangroves as a sensitive and important ecosystem. Consequently, the objective of this study is to identify the main causes for the destruction of mangroves in the Chilaw lagoon, an area where the devastation is extensively observed. Furthermore, this study intends to focus on identifying the effects on mangrove flora, and fauna species and the effects on aquatic life in the ecosystem.

Methodology

The study area was Pambala, also called the Pambala-Chilaw lagoon complex, the southern part of Chilaw lagoon on the west coast of Sri Lanka. The present study was based on primary and secondary data. A sampling method has been used to collect primary data and a sample of 30 families living near the mangrove areas has been selected and a questionnaire survey was conducted. This sample included different stakeholders. An understanding of the lagoon area of mangroves was obtained through field observation. Secondary data were collected from various sources such as books, magazines and newspapers, and records of the

Small Fishery Federation of Sri Lanka and web sources. MS excel was used to analysis data and pie charts used for representing data.

Results

The extent of mangroves in Sri Lanka is small compared to most Asian countries. They are, however, significant, as a percentage of available land in the low-lying maritime regions. The extent of mangrove area in Chilaw lagoon was found to be 667 hectares where 16 and 13 mangrove-associated species were recorded. It was found that some reduction of mangroves has occurred due to shrimp farming, timber mining and expanding human settlements. The major factor that has led the destruction in Chilaw lagoon is shrimp farming. It rates about 80%. The conversion of mangroves to aquaculture ponds is responsible for about of the total mangrove loss (Wijesinghe, 2011). In addition to the direct destruction of mangroves, shrimp farming has also caused some degradation of water quality in lagoons and the loss of biodiversity in the mangrove ecosystem. Here shrimp farmers discharge used water to the lagoon than a man-made pond. It depicted that 67% of people discharge used water to the Chilaw lagoon and 33% of people discharge used water to the man- made a pond.

Conclusion and Recommendations

The destruction causes have serious negative impacts on the mangrove ecosystem and lagoon due to unplanned human activities. One of the greatest threats to mangrove survival comes from shrimp farming. This was evident through its impact on both biotic and abiotic components of the ecosystem. If the current trends continue, it may have serious implications for biodiversity conservation and ecosystem integrity as well for the aquaculture industry itself.

It is recommended that mangrove areas should be designated for educational and research purposes and should emphasize the ecological and economic value of mangrove ecosystems as a national resource.

Keywords: Mangroves, Destruction, Shrimp farming, Ecosystem change, Conservation strategies

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ශ්‍රී ලංකාවේ තෙත් කලාපයේ පුරාතන පරිසරය ගස් ගොළුබෙල්ලන්ගේ (ACAVUS) කවචන්ති බාහිර රූප විද්‍යාත්මක ලක්ෂණ ඇසුරින් කළ පුරාවිද්‍යාත්මක අධ්‍යයනයකි.

දීර්ඝ සාරාංශය

කසුන් රුහිරු¹

හැඳින්වීම

ශ්‍රී ලංකාවේ ජලයීය ජීවීන්ගේ හා භෞමික ජීවීන් ව හිඳ වඳ වී ගිය සත්ත්ව විශේෂ පිළිබඳ අධ්‍යයනය සඳහා ත් මෙරට ජීවත් වූ මධ්‍ය පැලියොලිතික හා මධ්‍ය ශිලා යුගයේ මානවයාගේ දෛනික ජීවන රටාව පිළිබඳ අධ්‍යයනය කිරීම සඳහා ත් පුරාතන දේශගුණික සාධක අධ්‍යයනය කිරීම ඉතා වැදගත් වේ. ජගත් ජෛව විවිධත්ව උණුසුම් ස්ථාන දහය ඇතුරින් ශ්‍රී ලංකාවට හිමිවන්නේ විශේෂ ස්ථානයකි. එබැවින් ජෛව විවිධත්ව බලකායේ ප්‍රධාන ස්ථානයක් භෞමික ගොළුබෙල්ලන්ට ද නිරන්තරයෙන් ම හිමි වේ. වර්තමානයේ මෙරට භෞමික ගොළුබෙල්ලි විශේෂ 253 ක් වාර්තා වන අතර ඉන් 205 ශ්‍රී ලංකාවට ආවේණික වේ (Ranwana&Priyadarshana ,2012). මෙහිදී ගොඩවනාලන්ත සම්භවයකින් පැවතෙතැයි සැලකෙන අකාවුස් (ACAVUS) ගණයේ ගොළුබෙල්ලන් වසර මිලියන 200 ක සිට වර්තමානය දක්වා අඛණ්ඩව පැවත එනු ඇත. මෙම විශේෂයන්ට අයත් ගොළුබෙල්ලි කවච ප්‍රාග් ඓතිහාසික කැණීම් මගින් මෙන්ම සජීවී ගොළුබෙල්ලන් වර්තමානයේ ද තෙත් කලාපයෙන් හමුවන බැවින් ඒවා ජීව දර්ශක විශේෂ (Bio Indicator Species) ලෙස ද සැලකිය හැකිය. දළ වශයෙන් අවසන් වසර පනස් දහස කුළ පහතරට වර්ෂා වනාන්තර ආශ්‍රිතව උෂ්ණත්වය සෙන්ටිග්‍රේඩ් අංශක පහකින් හෝ වෙනස් වී නොමැති බව තෙත් කලාපීය ගල් ගුහා ආශ්‍රිත ප්‍රාග් ඓතිහාසික කැණීම් මගින් සනාථ වී ඇත (Kennedy &Deraniyagala 1989). මෙහි දී මෙම පාරිසරික විද්‍යාත්මක ගොඩනැගීම සිදු වන්නේ බටදොඹලෙනහි ප්‍රාග් ඓතිහාසික සන්දර්භ ඇතුරින් හමුවන අකාවුස් (*Acavussp*) ගණයට අයත් ගස් ගොළුබෙල්ලි කවච, කැකුණ (*Canariumzeylanicum*) මෙන්ම වල්දෙල් (*Artocarpusnobilis*) අනුසාරයෙනි (Perera 2010). අකාවුස් ගස් ගොළුබෙල්ලන් පරිසරයට ඉතා සංවේදී සත්ත්වයකු වන අතර පරිසරයේ උෂ්ණත්ව මානය ලෙස සලකනු ලැබේ. එබැවින් පුරාතන පරිසරය තේරුම් ගැනීම සඳහා ගස් ගොළුබෙල්ලන් ඉතා වැදගත් වන අතර ඒවා ජීව සාධකයක් ලෙස ද භාවිත කළ හැකිය.

අරමුණු

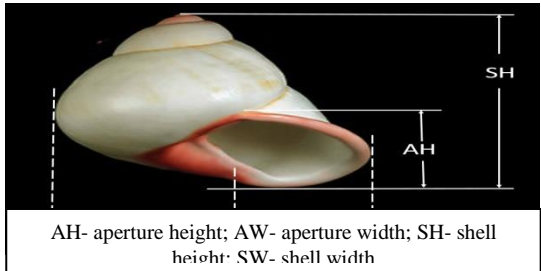
දේශගුණයේ වෙනස්වීම් මත මානවයා මෙන්ම සත්ත්වයන් ද ඊට අනුකූලව අනුවර්තනය වීම මෙන්ම පරිණාමය වීම සිදුවෙමින් පවතී. එබැවින් පුරාතන පරිසරය තේරුම් ගැනීම සඳහා පුරාකෘතියක් මෙන්ම ජීවී සාධකයක් ලෙස ද එක ලෙස වැදගත්වන ගස් ගොළුබෙල්ලන් (ACAVUS) පිළිබඳව පළව ඇති පූර්ව පර්යේෂණයන්ගේ අදහස් විවරණය කිරීමත්, පුරාතන පරිසර තත්ත්ව තේරුම් ගැනීම සඳහා අකාවුස් ගස් ගොළුබෙල්ලන්ගේ කවච භාවිත කර හැකි ද, වර්තමානයේ කවචයන්ගේ වෙනස්කම් මොනවාද, වත්මනේ මොවුන්ගේ පාරිසරික අනුවර්තන මොනවාද යන පර්යේෂණ ගැටළු මුල් කොට මෙම අධ්‍යයනය කරන ලදී.

ක්‍රමවේදය

බෙලිකටු අවශේෂ ද්‍රව්‍යයමය වුව ද එහි අතීත පැතිකඩ විවර වන්නේ පුරාවිද්‍යාව, පුරාමෘද්වංශ විද්‍යාව (Archaeomalacology) ආදී විෂයන් තුළින් බැවින් එය සාකච්ඡාවට බඳුන් කළ හැක්කේ එකී ප්‍රවේශයන් තුළින් ම ය. එබැවින් පුස්තකාල අධ්‍යයනයෙන් හා අන්තර්ජාලය භාවිතයෙන් මෙන්ම පූර්ව පර්යේෂකයන් සමඟ සාකච්ඡා කිරීමෙන් අනතුරුව පුරා පාරිසරික විද්‍යා ප්‍රවේශයක් ගනිමින් මෘද්වංශ විද්‍යාව තුළ පැමිණෙන සංකල්ප ද පෙරදැරිව බාහිර රූප විද්‍යාත්මක ලක්ෂණ ඇසුරින් අධ්‍යයනය කරන ලදී.

ප්‍රතිඵල

මෙම පර්යේෂණය සඳහා ප්‍රාග් ඓතිහාසික ගුහා ආශ්‍රිතව එනම් බටදොඹ ලෙන, පොත්ගල් ලෙන, දොරවක ඇතුබැඳි ලෙන, පාහියන්ගල ලෙන ආශ්‍රිතව වත්මන් පරිසර තත්ත්වය හා ඒ ආශ්‍රිත ගස් ගොළුබෙල්ලන්ගේ ව්‍යාප්තිය මූලික ලෙස ගවේශනය කරන ලදී. මෙහි දී මීටර 25X25 කොටසක් ගවේශනය කරනු ලැබූ අතර එහිදී අකාවුස් සුපර්බස් (*Acavussubperbus*) හා අකාවුස්පීනික්ස් (*Acavus phoenix*) යන විශේෂයන්හි සජීවී බෙල්ලන් 40 දෙනෙකු යොදා ගනිමින් බෙල්ලන්ගේ බර, උස, පළල, තොලෙහි සනකම කටෙහි විශ්කම්භය යන මිනුම් ලබා ගැනීම සිදු කළ අතර මෙම දත්තයන් ප්‍රාග් ඓතිහාසික සංදර්භයන්ගේ ගොළුබෙල්ලි කවච සමඟ සංසන්දනාත්මක ලෙස අධ්‍යයනය කරන ලදී.



¹ පුරාවිද්‍යා හා උරුම කළමනාකරණ අධ්‍යයනාංශය , ශ්‍රී ලංකා ,රජරට විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව .

ප්‍රේමතිලක හා රිස්බර්ග් විසින් හෝර්ටන් තැන්නේ පරාග පිළිබඳ කරනු ලබන අධ්‍යයනයෙන් පසු ගිය වසර 24000 තුළ ශ්‍රී ලංකාවේ දේශගුණයේ වූ වෙනස්කම් ඉහළ කඳුකර වර්ෂා වනාන්තර ආශ්‍රයෙන් එම කලාප සඳහා ගොඩනගා ඇත (Premathilaka & Risberg, 2003). එහිදී අර්ධ ශුෂ්ක දේශගුණයන්, අර්ධ තෙත් දේශගුණයන්, වියළි දේශගුණයන්, තෙත් දේශගුණයන් ආදී වශයෙන් වෙනත් දේශගුණ තත්ත්වයන් දැරූ බව ද අනාවරණය කොට ඇත. මෙහි දී තෙත් දේශගුණික කලාපයන්හි ව්‍යාප්තියක් පෙන්වන බවට සැලකෙන මෙම ගස් ගොළුබෙල්ලන් ප්‍රාග් ඓතිහාසික සන්ධර්භ තුළින් හමුවන බෙලිකටු සමඟ බාහිර රූප විද්‍යාත්මකව පරීක්ෂා කර බැලීමේ දී මොවුන් වත්මනේ පෙර ජීවත් වූ ගොළුබෙල්ලන්ට වඩා කුඩා වී ඇති බවක් මෙම පර්යේෂණයෙන් හඳුනා ගන්නා ලදී. එමෙන්ම ගොළුබෙලි කවචයේ හැඩය ද යම් වෙනස්වීමක් පෙන්වයි. මෙසේ වීමට හේතුව ලෙස සුර්යාලෝක සඳහා අනුවර්තනය වීමක් ලෙස හඳුනාගත හැකි අතර මෙහිදී ක්‍රමයෙන් ඔවුන් ලැබූ ප්‍රතිඵලයක් ලෙස තෙත් කලාපයේ ජීවත්වන අකාවුස් ගණයේ ගොළුබෙල්ලන් වියළි කලාපයේ යම් දුරක් සංක්‍රමණය කර ඇති බවක් අනාවරණය විය. එනම් මෙම අකාවුස් ගණයේ ගස් ගොළුබෙල්ලන් රත්නපුර දිස්ත්‍රික්කයේ, බලංගොඩ ප්‍රදේශයේ කිංවිගුණේ ග්‍රාමයේ වලවේ ගඟ දෙපස ද ජීවත් වේ. එබැවින් ඉහත දක්වන කරුණු මත පදනම්ව ගත් කළ පහත රට තෙත් කලාපයේ අවසාන වසර 50,000 තුළ ජීවත් වූ ජීවියෙක් ලෙස තවමත් මෙම ගස් ගොළුබෙල්ලන් අඛණ්ඩව ජීවත්වන අතර ඔවුන්ට වියළි කලාපයේ ඇති තෙත් පරිසර තත්ත්ව යටතේ වුව ද යම් අනුවර්ථනයන් සහිතව ජීවත් විය හැකි බව හඳුනා ගන්නා ලදී.

මූලාශ්‍ර පද

තෙත් කලාපය, ගස් ගොළුබෙල්ලා, රූප විද්‍යාත්මක ලක්ෂණ, පුරාතන පරිසරය

ආශ්‍රිත ග්‍රන්ථ

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යාන් මය නිම්නයේ කොක්ඵබේ පූර්ව ඓතිහාසික ජනාවාසකරණය උදෙසා බලපෑ භූගෝලීය සාධක පිළිබඳ අධ්‍යයනයක්

දීර්ඝ සාරාංශය

ඩී. එම්. නදීර හර්ෂජිත් දිසානායක¹

හැඳින්වීම

මිනිසාගේ ජීවනෝපාය තීරණය කිරීමෙහිලා ඇත අතීතයේ පටන් ම පරිසරය තීරණාත්මක සාධකයක් වූ බව අපි කවුරුන් දනිමු. ප්‍රාග් ඓතිහාසික අවධියේ පටන් එහි අඩුවැඩි ආකාරයේ මැදිහත්වීම පිළිබඳ විවිධ අධ්‍යයනයන් මගින් හෙළි වේ. මානව අතීතයේ සුවිශේෂී සංධිස්ථානයක් වන පූර්ව ඓතිහාසික අවධියේ දී මිනිසා හා පරිසරය අතර සංකීර්ණ සම්බන්ධතාවයක් හඳුනාගන්නට ලැබෙයි. යාන් මය නිම්නයට අදාළව මෙම අවධියට අයත් සාධක සහිත ස්ථාන 25කට වැඩි ප්‍රමාණයක් පුරාවිද්‍යා පශ්චාත් උපාධි ආයතනයේ ජ්‍යෙෂ්ඨ කතිකාවාර්ය රංජන් දිසානායක විසින් හඳුනාගෙන තිබේ. ඒ අතරින් 2016 වර්ෂයේ දී ශ්‍රී ලංකා රජරට විශ්වවිද්‍යාලයේ පුරාවිද්‍යා අධ්‍යයනාංශය විසින් කැණීම් කර ප්‍රකාශයට පත් කරන ලද කොක්ඵබේ මහාශිලා සුසානය ඉතා වැදගත් වේ.

අරමුණු

මෙම අධ්‍යයනය මගින් අපේක්ෂා කරනුයේ ක්‍රි.පූ. 800 පමණ කාලයක පටන් එම ප්‍රදේශය මානව ජනාවාසකරණයට ලක්වීම කෙරෙහි බලපෑ භූගෝලීය සාධකයන් හඳුනා ගැනීම ය.

ක්‍රමවේදය

මෙහි අධ්‍යයන ක්‍රමවේදය ලෙස පූර්ව පර්යේෂණ අධ්‍යයනයක් හා ක්ෂේත්‍ර ගවේෂණ ක්‍රියාවලියක් මගින් තොරතුරු පදනම් කර ගන්නා ලදී.

ප්‍රතිඵල

අනුරාධපුර ඇතුල්නුවර කැනීමෙන් ලැබෙන සාධක අනුව වියළි කලාපයට අයත් පූර්ව ඓතිහාසික අවධියේ දත්තයන් ක්‍රි.පූ. 1000 දක්වා කාලයකට අයත් වෙයි. කොක්ඵබේ සාධක ක්‍රි.පූ. 800 පමණ කාලයකට කාලනිර්ණ විමත් සමඟ මෙම ජනාවාසය ද අනුරාධපුරයට සමකාලීන වූ බව සිතිය හැකි ය. ඉන් පැහැදිලි වන්නේ ශිලා මෙවලම් භාවිතයෙන් ක්‍රමයෙන් මිදුණු මානවයා කෘෂිකර්මාන්තය ප්‍රමුඛ කරගත් යැපුම් රටාවකට නැඹුරු වන විට මෙම ගංගා නිම්න ඉතා වැදගත් වූ බවයි. වියළි කලාපීය පූර්ව ඓතිහාසික අවධියේ ජනාවාසය, මහාශිලා සුසාන සමූහයකට අමතරව ජලාශ්‍රිතව, ගංගා පිටාර තැන්නක, සරු පස හා පාෂාණ විහිදුමක් ආශ්‍රිතව විශේෂයෙන් ම හඳුනාගන්නට හැකි වේ (katugampola, 2015 129-134). විශේෂයෙන් ම කෘෂිකර්මාන්තය ඇතුළු එදිනෙදා ජල අවශ්‍යතා සඳහා ගංගා නිම්න ප්‍රදේශ ඔවුන් විසින්

තෝරාගන්නට ඇත. කොක්ඵබේ ප්‍රදේශය අයත් වන්නේ ද යාන් මය මධ්‍ය නිම්න ප්‍රදේශයට ය. යාන් මය සිට මීටර් 500 පමණ වූ දුරකින් සුසාන භූමිය ස්ථාපිත වී ඇති අතර එය යාන් මය සාමාන්‍ය පිටාර සීමාවෙන් කෙළවර වේ. පූර්ව ඓතිහාසික අවධියේ මානව ජනාවාසය ලෙසින් සැලකිය හැකි, සුසානයට උතුරු දෙසින් ඇති අක්කර 20ක පමණ වූ භූමිය ද උස් බිමක හඳුනාගත හැකි ය.

කොක්ඵබේ ප්‍රදේශය අයත් වන්නේ විජයානු සංකීර්ණයට හා උස්බිම් සංකීර්ණයට අයත් වන අන්තර් භූ කලාපයට ය. මේ නිම්නය පුරා දැකිය හැක්කේ රතු දුඹුරු පස (Reddish Brown Soil) හා ඇලුවියල් පස (Alluvial Soil) වලිනි (මෙන්ඩිස්, 2016). ප්‍රාථමික කෘෂිකාර්මික ජන සමාජයක් මුල්බැස ගැනීම සඳහා මේ සාරවත් පරිසරය සෘජු සාධකයක් වන්නට ඇත. ඒ අනුව කොක්ඵබේ සුසානයන් යාන් මයත් අතර පිටාර තැන්න මුල් කෘෂිකාර්මික බිම් වූවාට සැක නැත.

එමෙන් ම කොක්ඵබේ ආශ්‍රිත ශේෂ කන්ද ජනාවාසකරණයට අවශ්‍ය සාධක සම්පූර්ණ කරන භූගෝලීය පිහිටීමකි. විශේෂයෙන් ම ඒ සඳහා සුසාන ඉදිකිරීම සඳහා අවශ්‍ය කරන පාෂාණ ලබා ගැනීමට ද කඳු නිසා හට ගන්නා සමෝච්ඡ විවිධතා වැදගත් වේ. එසේ හටගන්නා භූපතනයන්හි ඊසානදිග මෝසමෙන් ලැබෙන ජලය රැදීම නිසා මානව ජල අවශ්‍යතාවය ද සපුරාලන ලදී. පසුකාලීනව වාරි නිර්මාණයක් කරා සංවර්ධනය වන්නේ මෙම සුවිශේෂී භූගෝලීය පිහිටීමයි.

මීට අමතරව සේරුවිල තඹ නිධියේ පිහිටීම ද එය අනුරාධපුර නාගරික පද්ධතිය කෙරෙහි බද්ධ වීමත් සමඟ ඇති වූ සම්පත් පරිවහනය ද මේ ජනාවාසකරණය කරා බලපෑම් කරන ලදී. කොක්ඵබේ ආශ්‍රිතව හමුවන පරහද නම් බනිජ සම්පත ද සුවිශේෂී පිහිටීමක් විය.

මේ අනුව බලන විට කොක්ඵබේ පූර්ව ඓතිහාසික ජනාවාසකරණය කෙරෙහි ප්‍රදේශය ආශ්‍රිත භූගෝලීය පිහිටීම සෘජු බලපෑමක් එල්ල කරන බව පැහැදිලි වෙයි.

මූලාශ්‍ර

පූර්ව ඓතිහාසික, කොක්ඵබේ, යාන්මය, භූගෝලීය, ජනාවාසකරණය

ආශ්‍රිත මූලාශ්‍ර

Katugampola, M.(2015) Beyond What We Seeing: An Inter Site Spatial Pattern of Megalithic Burial Complexes in Yan Oya Middle Basin (YOMB), Sri Lanka . International Journal of Culture and History, Vol. 1, No. 2, 129-134

මෙන්ඩිස්, ටී.ඩී. (2016) අවුරුදු 2800කට පෙර යාන්මය නිම්නයේ ජනාවාසකරණය. ඉරිදා. 25, සැප්තැම්බර්

¹ පුරාවිද්‍යා හා උරුම කළමනාකරණ අධ්‍යයනාංශය , ශ්‍රී ලංකා රජරට විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව .

පදානසරාම සංකීර්ණ ආශ්‍රිත ජල කළමනාකරණය

(රිටිගල හා කිරලාගල ක්ෂේත්‍ර ඇසුරින්)

දීර්ඝ සාරාංශය

ජේ.එම්.ඉන්දික රුවන් කුමාර ජයසේකර¹

හැඳින්වීම

මෙරට ජල කළමනාකරණය පිළිබඳ මුල් සාධකයන් පූර්ව ඓතිහාසික අවධියේ දී හමු වේ. කාලයත් සමග ලද අන්දැකීම් හා නොයෙකුත් සමාජීය සංකල්ප ද මුසු වී විශිෂ්ට වාරි පද්ධතියක් මෙරට වියළි කලාපය තුළ ගොඩනැගීමට හේතු විය. මෙරට ජල කළමනාකරණය වාරි පද්ධතිය මත පමණක් නොව ආගමික හා ලෞකික ඉදිකිරීම් ආශ්‍රිතව ද ක්‍රියාත්මක විය.

සංඝාරාම වර්ග අතර පදානසරාමවලට හිමිවන්නේ ප්‍රධාන ස්ථානයකි. පදානසර පිළිබඳව තොරතුරු සපයන සාහිත්‍ය මූලාශ්‍රයන් ලෙස මහාවංශය, සමන්තපාසාදිකාව, රසවාහිණිය, පාලි බෝධිවංශය හා දම්පියා අටුවා ගැටපදය මෙන් ම පෙරියන්කුලම, මැදිරිගිය ටැම් ලිපිය, මන්නාරම කවිවේරි ලිපිය, අනුරාධපුර පුවරු ලිපිය ආදී ශිලා ලේඛන මූලාශ්‍රයන් වැදගත් වේ. මේ පිළිබඳව අධ්‍යයනයන් එච් සී පී බෙල්, හෝර්කාට් (1924), සේනක බණ්ඩාරනායක (1974), ගාමිණී විජේසූරිය සිදුකර ඇත . භාවනායෝගී හික්සන් සඳහා නිර්මාණය කර ඇති මෙම ආරාම වර්ගය ඉදිකිරීමේ දී අවට පරිසරයේ තිබෙන ජලය මනාව කළමනාකරණය කර ඇති බවට සාක්ෂි හඳුනා ගැනීමට පුළුවන.

අරමුණු

මෙම අධ්‍යයනයේ අරමුණ වන්නේ වියළි කලාපයේ අනුරාධපුර දිස්ත්‍රික්කයේ පිහිටා තිබෙන කිරලාගල හා රිටිගල පදානසර ආශ්‍රිත ව හඳුනාගත හැකි පුරාණ ජල කළමනාකරණය පිළිබඳ අධ්‍යයනය කිරීම වේ. එහි දී මූලිකව ජලය ලැබෙන හා එම ජල කළමනාකරණය කිරීමට යොදාගෙන ඇති ක්‍රමවේදයන් පිළිබඳ අවධානය යොමු කරනු ලැබේ.

ක්‍රමවේදය

පර්යේෂණ ක්‍රමවේදය වශයෙන් පළමුව පූර්ව ක්ෂේත්‍ර අධ්‍යයන පරීක්ෂා කිරීම සිදුකර ඇත. එම තොරතුරු පදනම් කරගනිමින් සිදුකළ ක්ෂේත්‍ර ගවේෂණය ඇසුරින් ලබාගත් තොරතුරු විමර්ශනය කරමින් මෙම අධ්‍යයනය සිදු කරනු ලැබීය.

ප්‍රතිඵල

පාරිසරික තත්ත්වය ගත් විට වියළි කලාපයේ අභ්‍යන්තර තැනිතලාවට අයත් වේ. මෙම ප්‍රදේශයට වැඩි ජල ප්‍රමාණයක් ලැබෙනුයේ ඊසාන දිග මෝසම

¹ පුරාවිද්‍යා හා උරුම කළමනාකරණ අධ්‍යයනාංශය , ශ්‍රී ලංකා ,රජරට විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව .

තුළින් ඉතා කෙටි කාලයක් ය. නමුත් මෙහි නිර්මිත පරිසරය සැලකීමේ දී විවිධත්වයක් ඉතා පැහැදිලිව හඳුනාගත හැකි ය. මෙම විවිධත්වය ඒවායේ ජල කළමනාකරණ ක්‍රමවේදයන් වෙනස් වීමට බලපා ඇත.

කිරලාගල ක්ෂේත්‍රය සැලකීමේ දී එය ස්වභාවික ගල් තලාවක් ආශ්‍රය කරගනිමින් නිර්මාණය කර ඇති ආරාම සංකීර්ණයකි. රිටිගල තරම් විශාල ආරාම සංකීර්ණයක් නොවන මෙහි ජල අවශ්‍යතාවන් සපුරා ගැනීමට සකස් කළ ස්ථාන දෙකක් දක්නට ලැබේ. ප්‍රධාන ගොඩනැගිල්ල අසල ගල් තලාව ආශ්‍රිත ව ස්වභාවික නිර්මාණය වී ඇති පොකුණ හා ජන්තාසරය ආසන්නයේ ඉදිකර තිබෙන විශාල පොකුණ ප්‍රධාන ජල මූලාශ්‍රයන් ය. මෙහි ජල මූලාශ්‍රයන් වනුයේ වර්ෂාවෙන් වන අතර විශාල පොකුණට බාහිරින් ජලය සම්පාදනය කිරීමක් සිදුකර ඇති බවට සාක්ෂි වේ. ජලය සීමිත පරිසරයක පිහිටි කිරලාගල ආශ්‍රිත ව කිසියම් ප්‍රමාණයක වැසි ජල කළමනාකරණයක් සිදු කර ඇති බව අනුමාන කළ හැකි ය. ගල් තලාව ආශ්‍රිතව පොකුණ ඉදි කිරීම තුළ ඒවායේ රැස්වෙන ජලය භූමියට කාන්දු වීමක් නොවී දිගුකලක් සුරක්ෂිතව තබාගැනීමේ හැකියාව මෙම ස්ථානයෙන් ලැබේ. කෙසේ වෙතත් මෙම ස්ථානය ආශ්‍රිතව ජලය බෙදා හැරීමක් හඳුනාගත නොහැකි ය.

කිරලාගලට වඩා වෙනස් වූ පරිසරික තත්ත්වයක් රිටිගල දක්නට ලැබේ. මෙය අභ්‍යන්තර තැනිතලාවේ වන ශේෂ කන්දකි. රජරට වියළි කලාපයේ වැඩිම වර්ෂාපතනයක් ලැබෙන මෙහි සුවිශේෂී පරිසර පද්ධතියක් වේ. මෙම කඳු පන්තියේ නැගෙනහිර දිශාවට වන්නට පදානසර සහිත විශාල ආරාම සංකීර්ණය නිර්මාණය කර ඇත. මෙම ස්ථානයට ජලය ලැබෙන ප්‍රධාන ආකාරයන් දෙකක් පවතී. එනම් ඊසාන දිග මෝසම් වර්ෂාව හා ස්වභාවික උල්පත් ජලය යි. වනාන්තර සහිත කඳු ප්‍රදේශයට ලැබෙන වර්ෂාව හේතුවෙන් භූගත ජලය රැදීම නිසා උල්පත් සක්‍රීය වීම රිටිගල ආශ්‍රිතව හඳුනාගත හැකි ය. ඒ අනුව රිටිගල නිර්මිත පරිසරය ස්වභාවික ජල මූලාශ්‍රයන් පදනම් කරමින් සිදුකර ඇත. සෑම පදානසරයක්ම දෙපසින් ස්වභාවික ජල මාර්ගයන් දොල පහරක් ලෙසින් ගලා බසී. මෙම ස්වභාවික ජල මූලාශ්‍රයන් එක් කොට ප්‍රධාන වශයෙන් ජලය ගබඩා කිරීමට කඳු පාමුලට වන්නට විශාල පොකුණක් නිර්මාණය කර ඇති අතර මෙය බන්දා පොකුණ ලෙසින් ව්‍යවහාර වේ. උල්පතක් හේතුවෙන් මෙම පොකුණ වසර පුරාම ජලයෙන් පිරී පවතින්නට ඇත. ස්වභාවික උල්පත් ජලය පදනම් කරගනිමින් ආරාම සංකීර්ණයේ ඉහළට වන්නට ලීදක් ද, ජල මාර්ගයක් හරස්කර නොයෙකුත් අවශ්‍යතාවන්ට ජලය රඳවා ගැනීමට ද කටයුතු කර ඇති බවට සාක්ෂි පවතී. පරිසරයේ පවතින පෝෂණීය බව හේතුවෙන් රිටිගල පදානසර ආශ්‍රිතව ජල හිඟයක් පුරාණයේ දී හට නොගන්නට ඇත.

සාරාංශය

රිටිගල හා කිරලාගල යන ක්ෂේත්‍රයන් වියළි කලාපයේ පිහිටා තිබුණ ද එම ස්ථානයන් හි පවතින්නේ එකිනෙකට වෙනස් ජල කළමනාකරණ තත්ත්වයන් ය. මෙයට හේතුව මෙම පදානසරයන් පිහිටා තිබෙන භූ පිහිටීම ආශ්‍රිතව ගොඩනැගෙන පාරිසරික තත්ත්වයයි. එමෙන්ම ජල මූලාශ්‍රවල ප්‍රමාණය හා ඒවායේ විවිධත්වය පදනම් කරගනිමින් ලැබෙන ජල ප්‍රමාණය උපරිමව ප්‍රයෝජනයට ගනිමින් හා පදානසර

සංඝාරාමයන්ගේ අලංකාරත්වය ඉස්මතු වන ආකාරයෙන් එය කළමනාකරණය කර තිබෙන බව හඳුනා ගැනීමට පුළුවන. එය පුරාණ ඡනයාගේ ජලය හා පරිසරය සමඟ පැවැති බද්ධතාවය ආගමික වාස්තු විද්‍යාව සඳහා ද එකතු කළ එක් අවස්ථාවක් ලෙස පෙන්වා දිය හැකි ය.

මූලාශ්‍ර

ජල කළමනාකරණය, පදනම, රිටිගල, කිරලාගල, පරිසර තත්ත්වය

ආශ්‍රිත ග්‍රන්ථ

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දීර්ඝ සාරාංශය

ආර්.ඒ.එම් රණතුංග¹

හැඳින්වීම

මෙරට පූර්ව ඓතිහාසික හා ඓතිහාසික කාල පරාසයන් හි ජනාවාස ව්‍යාප්තියේ දී වියළි කලාපය ඉතාම වැදගත් වේ. විශේෂයෙන් වියළි කලාපීය ගංගා නිම්න ආශ්‍රිතව බහුලව ම පූර්ව ඓතිහාසික ජනාවාස සාධක හඳුනාගත හැකි වේ. මල්වතුමය නිම්නය, යාන්මය නිම්නය හා දූදුරුමය ඇතුළු බොහෝ ගංගා නිම්නයන් ආශ්‍රිත ප්‍රදේශයන් හා තදාශ්‍රිත කලාපයේ බහුලව ක්‍රි.පූ 1000 ට හා ඊට පසු කාල වකවානුවලට අයත් මානව සාධක හමුවීම මෙය මැනවින් තහවුරු කරන්නෙකි. යම් ප්‍රදේශයක මානව ජනාවාස බිහිවීමේ දී විවිධ පාරිසරික දේශගුණික හා භූ විද්‍යාත්මක සාධක රැසක් බලපානු ලබයි. මෙහිදී අධ්‍යයන ප්‍රදේශය ලෙස මා ඔය (වැලිමය) ආශ්‍රිත කලාපය තෝරාගනු ලැබූ අතර මා ඔය මුලතිව් හා වවුනියා රක්ෂිත ප්‍රදේශයෙන් ආරම්භ වන කිවුල්මයට පදවි වැවෙහි වාන් ඇළ වන මොරමය එක්වීමෙන් සෑදෙන අක්‍රමිකවලින් නිර්මාණය වේ. කෝකිලායි කලපුවෙන් මුහුදට වැටෙන මා ඔය ඊසාන දිග මෝසම් සමයේ දී වඩාත් සක්‍රීයවන සමයේ විශාල ජල ධාරිතාවක් ගෙන ගිය ද වර්ෂයේ අනෙකුත් කාලයට කුඩා දියපහරක් ලෙස ගලා බසින මධ්‍යම ප්‍රමාණයේ ඔයකි. ආරම්භ නටබුන් පැරණි වාර්මාර්ග හා මානව ජනාවාස සාධක රැසක් මෙම මාඔය ආශ්‍රිත භූ කලාපය ආශ්‍රිතව හඳුනාගත හැකි වේ.

අරමුණු

මෙම අධ්‍යයනයෙන් හඳුනාගැනීමට උත්සහ කරන්නේ මෙරට වියළි කලාපීය තැනිතලා භූමියේ මානව ජනාවාස බිහිවීමේ දී ගංගා ආශ්‍රිත භූ රූපයන් කෙබඳු අයුරින් දායක වී ද යන්න යි.

ක්‍රමවේදය.

මෙම අධ්‍යයනය සඳහා ගංගා ආශ්‍රිත භූ රූප පිළිබඳ අධ්‍යයනය කිරීමට පුස්තකාල අධ්‍යයනය සිදුකර භූ රූපවිද්‍යාවට අදාළව ගංගා භූ රූපයන් නිවැරදිව හඳුනාගැනීමත් ඊට අමතරව පූර්ව ඓතිහාසික හා ඓතිහාසික කාලසීමාවන්හි ගංගා නිම්න ආශ්‍රිත ජනාවාස බිහිවීම පිළිබඳ තොරතුරු මූලාශ්‍ර ඇසුරින් හඳුනා ගැනීම සිදු කෙරිණි. එසේ ම ක්ෂේත්‍ර ගවේෂණය සිදුකරමින් මූලාශ්‍රයන් හි අන්තර්ගත තොරතුරු අනුව ගංගා භූ රූපයන් මා ඔය නිම්නය ආශ්‍රිතව පවතී ද යන්න හඳුනා ගැනීම සඳහා එම භූ රූප ආශ්‍රිතව ඇති පැරණි ජනාවාස සාධක හඳුනා ගැනීම සඳහා ක්ෂේත්‍ර අධ්‍යයනය සිදු කිරීම ද ක්‍රමවේද ලෙස භාවිත කරන ලදී.

ප්‍රතිඵල

ශ්‍රී ලංකාව වෙරළේ සිට රට මධ්‍යයට ක්‍රමයෙන් උස වැඩි වෙමින් සකස්වී ඇති දූපතකි. එම උස මට්ටම් අනුව ලංකාව ප්‍රධාන භූ විෂමතා කලාප 03 කට බෙදා තිබේ. එනම් වෙරළබඩ තැනිතලාව 0m-30m, අභ්‍යන්තර තැනිතලාව 30m-300m, මධ්‍යම කඳුකරය 300m වැඩි ආදී වශයෙනි. මීට අමතරව සබරගමු කඳු හා ගල් ඔය කඳු උප භූ විෂමතා කලාප ලෙස හඳුනාගත හැකි ය. මෙම කලාපවලින් අධ්‍යයනය සඳහා යොදා ගන්නා මාඔය වියළි කලාපයේ අභ්‍යන්තර තැනිතලාවට අයත් වේ. එමෙන්ම මෙහිදී ගංගාවක් විවිධ අවස්ථාවන්හි දී නිර්මාණය කරන්නා වූ භූ රූපයන් හඳුනාගත යුතු වේ. ගංගාවක් ආරම්භක කොටස යොවන අවධිය ලෙසත් මැදි කොටස පරිණත අවධිය ලෙසත් පහළ කොටස ව්‍යාද්ධ අවධිය ලෙසත් හඳුනා ගනී. වියළි කලාපීය තැනිතලාවේ දී ගංගාවක් බොහෝවිට තම ව්‍යාද්ධ අවධියේ ගමන්කරයි. මෙම අවධියේ ගංගාවේ නිම්නය පුළුල් නොගැඹුරු වේ. වේගය ඉතා මන්දගාමී වේ. නමුත් විශාල ජල ධාරිතාවක් හා අවසාධිත අධික ප්‍රමාණයක් පරිවහනය කරනු ලබයි. මේ නිසා තද පාෂාණ මඟහරවමින් වංගු සහිත නිම්නයක ගමන්කරයි. මෙම ලක්ෂණය මාඔයෙහි බහුල ව දකගත හැකි වේ. මෙම ගං දඟරයන්හි දී පිටත ඉවුර බාදනයවීමත් ඇතුළු ඉවුරෙහි අවසාධිත තැන්පත්වීමත් සිදුවේ. ගංගාවක් නිරන්තරයෙන් එකම නිම්නයක ගමන් නොකරන අතර බාදනය හා අවසාධිත තැන්පත් වීමෙන් නිම්නය වෙනස් වේ. ගං දඟරයක් කාලයක් ගතවනවිට වංගු කොටස අහඟුර සෘජු මාර්ගයක ගමන් කරයි. මෙහි දී ගංගාවට සම්බන්ධ නොවූ අර්ධ කවාකාර නොගැඹුරු ජලාශයක් නිර්මාණය වේ. දුනුවිල ලෙස මෙම භූ ලක්ෂණය හඳුන්වයි. මෙම දුනුවිල් වර්ෂා කාලයට ගංගාව සමඟ සම්බන්ධ වුවත් වැඩිකාලයක් හුදෙකලා ජලාශයක් ලෙස මේවා පවතී. මාඔයෙහි මෙලෙස නිර්මාණය වූ දුනුවිල් ආශ්‍රිතව බෞද්ධ ආරාමික නටබුන් හා ජනාවාස සාධක බොහොමයක් හඳුනාගත හැකි වේ. ජනාවාසයක් නිර්මාණය වීමේ දී ජලය මූලික අවශ්‍යතාවක් වන හෙයින් මෙ වැනි ස්ථානයන් හි ජනාවාස ස්ථානගත වීමේ වැඩි ප්‍රවණතාවක් ඇති බව මෙයින් පැහැදිලි වේ. ව්‍යාද්ධ අවධියේ ගංගාව දඟර මාර්ගයක ගමන් කිරීමත් ජල පහරේ වේගය මන්දගාමී වීමත් යන කරුණු සැලකිල්ලට ගෙන පැරැන්නන් විසින් ගංගා තමන්ගේ අවශ්‍යතාවන්ට අනුව හසුරුවා ගෙන ඇත. මාඔය හරහා ගං දඟරයක් ආශ්‍රය කර ගනිමින් ඉදිකර ඇති වන්නදි පාලම ගල් අමුණ මෙයට හොඳම නිදර්ශනයකි. ගංගාවක් වංගුවක දී වේගය අඩුවන අතර එහෙයින් ඉදිකරන අමුණට සිදුවෙන බලපෑම අවම වේ. ඇළ මාර්ගයක් හරහා පහසුවෙන් ජලය හරවා යැවීමටත් එමඟින් හැකි වේ. එමෙන්ම මා ඔය වියළි සෘතුවේ කුඩා දියපහරක් ව පැවතිය ද ඊසාන දිග මෝසම් සමයේ විශාල ගඟක් බවට පත් වේ. එම ජලය ගලා යෑමෙන් සෑදෙන පිටාර තැනි කෘෂිකර්මාන්තයට ඉතා යෝග්‍ය වේ. වර්තමානයේ පවා මෙම පිටාර තැනි ආශ්‍රිතව හේන් ගොවිතැන් සිදුකරන විශාල තැනි බිම් පවතී.

මාඔය නිම්නයේ ක්ෂේත්‍ර ගවේෂණයෙන් හා මූලාශ්‍ර පරිශීලනයෙන් ලබාගත් තොරතුරු අනුව අභ්‍යන්තර තැනිතලා කලාපයේ නිර්මාණය වී ඇති ගංගා භූ රූප ආශ්‍රිත පරිසරය පැරැන්නන් තම කෘෂි ආර්ථික වපසරිය නිර්මාණය කරගැනීමේදී උපයෝගී කරගත් ආකාරය

¹ පුරාවිද්‍යා හා උරුම කළමනාකරණ අධ්‍යයනාංශය , ශ්‍රී ලංකා ලෙසරට විශ්ව විද්‍යාලය ශ්‍රී ලංකාව ග

මේ අනුව හඳුනාගත හැකි වේ. වියළි කලාපයේ ජල අවශ්‍යතාව මැනවින් හඳුනාගනිමින් ගංගා නිම්න මුල්කරගත් ජලාශ්‍රිත ශිෂ්ටාචාරයෙහි පදනම පිහිටුවා ගැනීමට ගංගා භූ රූප උපකාරී වූ ආකාරය මාඕය ආශ්‍රිත අධ්‍යයනයේ දී මැනවින් පැහැදිලි වේ.

මුඛ්‍ය පද

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ආශ්‍රිත ග්‍රන්ථ

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මැන්දිස්,ඩී. කුසි., අබේවර්ධන, නුවන්., විතානච්චි ,වන්දන, රෝහණ., 2016 අනුරාධපුර දීඝපාෂාණය ආශ්‍රිත මානව ජනාවාසකරණය, කර්තෘ ප්‍රකාශන.

මිහින්තලේ ආරාම සංකීර්ණය ආශ්‍රිත නිර්මාණකරණය සඳහා භාවිත පාෂාණ වර්ග

දීර්ඝ සාරාංශය

එම්.පී.වන්දිමා සඳමාලි ¹, නිමේෂා නිල්මිණි තෙන්නකෝන්

හැඳින්වීම

පාෂාණ අර්ථ දැක්වීමේ දී විවිධ ක්ෂේත්‍ර එකිනෙක වෙනස් අර්ථ නිරූපණ ලබා දේ. ඉංජිනේරු විද්‍යාවේ දී එය හඳුන්වා ඇත්තේ ශක්තිමත් එමෙන් ම සන ද්‍රව්‍ය පාෂාණ ලෙස ය. භූ විද්‍යාවට අනුව පාෂාණ යනු පෘථිවි පෘෂ්ඨයට අයත් ස්වභාවික නිර්මාණය වූ සමූහ හෝ බනිජ ද්‍රව්‍යවලින් සැදුම්ලත් ස්කන්ධයන් ය. ඒ නිසා පාෂාණ සංයුක්ත වී ඇත්තේ බනිජවලින් බව පැහැදිලි ය. එය තනි බනිජයකින් හෝ බනිජ වර්ග කිහිපයකින් විය හැකි ය. විශේෂයෙන් ම ස්මාරක, අලංකරණ අංග ආදිය නිර්මාණයේ දී පාෂාණයක පවත්නා බණිජ සංයුතියත් ඒවායේ ගුණ වශයෙන් හඳුනාගෙන ඇති වර්ණය, ලේඛාව, දැඩියාව, දීප්තිය, පැළුම් තල මෙන් ම විශිෂ්ට ගුරුත්වය යන කරුණු ඉතා වැදගත් වේ. මිහින්තලය භූ විද්‍යාත්මක වශයෙන් සැලකීමේ දී එය ශේෂ කන්දකි. පාෂාණමය නිර්මාණ සිදුකිරීමේ දී මුල් පාෂාණය භාවිත කිරීම සිදු විය. මිහින්තලයෙහි දැක ගත හැකි පාෂාණ භූ විද්‍යාත්මක වන්නී සංකීර්ණයට අයත්වේ. මෙහි පාෂාණ ආශ්‍රිත නිර්මාණ සිදු කිරීමේ දී විපරිත පාෂාණ යොදාගෙන ඇත. ඒ අතර යොදාගෙන තිබෙන පාෂාණ වර්ග වන්නේ, වානොකයිටිබයෝටයිටිනයිස් (Charnochitic biotite Gneiss), ග්‍රැනයිටික් නයිස් (Granitic gneiss), හොන්බ්ලෙන්ඩයෝටයිටිනයිස් (Hornblende biotitic gneiss) සහ මාර්බල් (Impure marble and dolomite marble) යි.

ක්‍රමවේදය

අධ්‍යයන ක්‍රමවේදය ලෙස ක්ෂේත්‍ර ගවේෂණයක් සිදු කරන ලදී. එමෙන් ම සාහිත්‍ය මූලාශ්‍ර අධ්‍යයනය මගින් දත්ත රැස්කර ගන්නා ලදී. වර්තමානයේ පුරාවිද්‍යාභූමිය තුළ දක්නට ලැබෙන පාෂාණමය ඉදිකිරීම් හඳුනා ගැනීම හා උපයෝගී කරගත් පාෂාණ මොනවා ද යන්නත් ඒවා උපයෝගී කරගැනීමට පාදක වූ ගුණ කවරේ ද යන්නත් මෙම ක්‍රමවේද ඔස්සේ හඳුනා ගන්නා ලදී.

ප්‍රතිඵල සාකච්ඡාව

මිහින්තලේ පුරාවිද්‍යා භූමිය තුළ ප්‍රධාන වශයෙන් හඳුනා ගත් පාෂාණ නිර්මාණ ලෙස ලෙන් ලිපි, පර්වත ලිපි, ටැම් ලිපි, පුවරු ලිපි, නාග පොකුණ, කළුදිය

පොකුණ, සිංහ පොකුණ, පැරණි වෙදහල, දාන ශාලාව,සන්නිපාන ශාලාව, පිරිවෙත් හා පිලිමගෙය, වාහල්කඩ කැටයම්, හිරි බුද්ධ ප්‍රතිමාව, සිංහ පොකුණේ කැටයම්, ගොඩනැගිලි අලංකාර කැටයම්, පියගැට

¹ පුරාවිද්‍යා හා උරුම කළමනාකරණ අධ්‍යයනය , ශ්‍රී ලංකා ලරජරට විශ්ව විද්‍යාලය ශ්‍රී ලංකාව ග

පෙළ හා මිහිඳු ගුහාව හඳුනාගත හැකි ය. ශිලා ලේඛන පිළිබඳව සැලකීමේ දී මිහින්තලයේ ලෙන් ලිපි, පර්වත ලිපි, පුවරු ලිපි, ටැම් ලිපි ලෙස විවිධ ස්වරූපයෙන් හමු වී ඇත. ලෙන් ආශ්‍රිතව හමු වී ඇති ලිපි 106කට අධික වේ. මෙම ලෙන් ලිපි කොටා ඇත්තේ නයිස් පාෂාණයේ ය. විශේෂත්වය වන්නේ නයිස් පාෂාණයේ ස්ඵටික කුඩා වීම මත අක්ෂර කෙටීමේ පහසුව යි.

මිහින්තලේ පූජනීය සහ අර්ධ පූජනීය ගොඩනැගිලිවලට පිවිසීමේ දී දැකිය හැකි අලංකරණ අංගවන සඳකඩ පහන්, මුරගල්, කොරවක්ගල් වේ. මේවා සඳහා ද භාවිත කර ඇත්තේ නයිස් පාෂාණය යි. විශේෂ කරුණක් ලෙස දැක්විය හැක්කේ විශේෂ ස්ඵටන සඳහා අලංකරණ අංග නිර්මාණයේ දී මාර්බල් පාෂාණය යොදා ගැනීම ය. උදාහරණයක් ලෙස මිහින්තලේ උඩමළුවෙහි පිහිටි සේල වෛත්‍යයෙහි අලංකරණ අංගයක් වන සඳකඩ පහන නිර්මාණය කර ඇත්තේ ඉහතින් සඳහන් කළ මාබල් පාෂාණයෙනි.

මිහින්තලේ කැටයම් අතර කණ්ඨක වෛත්‍යයේ වාහල්කඩ වාස්තු විද්‍යාත්මක වශයෙන් වැදගත් නිර්මාණාංගයක් ලෙස හඳුනාගත හැකි ය. වාහල්කඩ දෙපස ගල් කණු දෙක බැගින් දක්නට ලැබේ. එකී ගල්කණු මල්කම්, ලියකම්වලින් ද මිනිස් සහ සත්ත්ව (පක්ෂී සහ සිව්පා)රූපවලින් ද අලංකාර වී ඇත. නෙළුම් මල්, සිංහමුඛ, ඇත්හිස්, ලී ස්තර, පට්ටිකා, බොරදම් හා කැටයම් කුඩා ස්ඵටිකවලින් අලංකාර කර ඇති ලක්දිව පැරණිත ම ගණදෙවි මූර්තිය ද මෙහි නිර්මාණය කොට තිබේ. ඉහතින් සඳහන් කැටයම් වැඩි ප්‍රමාණයක් නිර්මාණය කර ඇත්තේ මාබල් පාෂාණය භාවිතයෙනි. මෙසේ කැටයම් සඳහා මෙම පාෂාණය බහුල ලෙස යොදාගෙන ඇත්තේ එම පාෂාණයේ ඇති දීප්තිමත් බවත් සියුම් නිර්මාණයන් කිරීමට ඇති හැකියාවත් නිසා බව උපකල්පනය කළ හැකි ය. මිහින්තලේ පුරාවිද්‍යා භූමිය ආශ්‍රිතව සිදුකරනු ලැබූ මෙම පර්යේෂණයේ දී ඉදිකිරීම් සඳහා බහුල වශයෙන් ම නයිස් පාෂාණය යොදාගෙන ඇති බවත් කැටයම් සඳහා මාබල් පාෂාණය ද යොදාගෙන ඇති බවත් පෙන්වා දියහැකි ය.

මූලාශ්‍ර

පාෂාණ, පැරණි නටබුන්, ආරාම, මිහින්තලේ ආශ්‍රිත ග්‍රන්ථ

මහනන්තිල, කුෂානි සහ විතානගේ, මෙන්නිකා .,2005, මිහින්තලයේ නිර්මාපකයෝ බනිජ සහ පාෂාණ, සරසවි ප්‍රකාශකයෝ, නුගේගොඩ.

මනමේන්ද්‍ර ආරච්චි, කැළුම් නලින්ද සහ අධිකාරී ගාමිණී., 2014, අනුරාධපුර පුරා ජෛව විවිධත්වය සහ වර්තමාන ජෛව විවිධත්වය, ජෛව විවිධත්ව ලේකම් කාර්යාලය සහ පුනර් ජනනීය බලශක්ති අමාත්‍යාංශය, බත්තරමුල්ල.

ලගමුව, ආරිය., 2014, මිහින්තලේ පූජනීය සිද්ධස්ඵටන හා පුරාවිද්‍යාත්මක ස්මාරක, කතෘ ප්‍රකාශනයකි.

ලගමුව, ආරිය., 2009, මිහින්තලේ කැටයම් මූර්ති හා බිතුසිතුවම්, පර්යේෂණ සහ ප්‍රකාශන කමිටුව, ශ්‍රී ලංකා රජරට විශ්ව විද්‍යාලය.

මා ඔය දකුණු නිම්නයේ අලව්ව ප්‍රාදේශීය ලේකම් කොට්ඨාසය ආශ්‍රිත ජනාවාසකරණයේ දී භූ දර්ශනය හා පාරිසරික සාධකවල උපයෝගීතාව

දීර්ඝ සාරාංශය

ශාලිකා කුරුනායක¹, එච්.ටී.සී.ඩී. හපුතන්ත්‍රි

හැඳින්වීම

ස්වාභාවික ගංගා නිම්න පාදක කර ගනිමින් අතීත ලංකාවේ ජනාවාසකරණය සිදුවීමේදී මාඔය නිම්නය ආශ්‍රිත ප්‍රදේශය අතිශයින්ම වැදගත් වේ. මාඔය ආශ්‍රිත ව සිදුවූ ජනාවාසකරණය පිළිබඳ ව අවධානය යොමු කිරීමේදී පුරාණ ශ්‍රී ලංකාවේ මානව ජනාවාසරටාව පිළිබඳ වැදගත් කරුණු රාශියක් මෙ මගින් අනාවරණය කර ගැනීමට හැකියාව ලැබේ. මධ්‍ය කඳුකරයේ බටහිර බෑවුමේ අම්බුළුවාව කඳුවලින් මාඔය ආරම්භ වේ, අනුපිති ඇල්ලෙන් පහළට ගමන්කරන මාඔය කැගල්ල දිස්ත්‍රික්කයේ අරණායක, මාවනැල්ල, රඹුක්කන වැනි නගර ආසන්නයේ හා කුරුණෑගල දිස්ත්‍රික්කයේ අලව්ව, ගිරිඋල්ල, කොටදෙණියාව වැනි ප්‍රදේශ ඔස්සේ කිලෝ මීටර් 125.5 ක දුරක් ගමන්කර මීගමුවට තරමක් උතුරු දෙසින් මුහුදට එකතු වේ (විතානච්චි, 2011)

මාඔය පෝෂණ කලාපයන්ගෙන් එක් ප්‍රදේශයක් වන අලව්ව ප්‍රාදේශීය ලේකම් කොට්ඨාසය අතීත ජනාවාසකරණ ව්‍යාප්තියේ දී වැදගත් ප්‍රදේශයක් වේ. මෙම කලාපය තුළ ආදි මානවයා විසින් භූමියේ පිහිටීම උපයෝගීකර ගනිමින් ඔවුනගේ වාසස්ථාන නිර්මාණය කරගත් බවට සාධක ප්‍රාග් ඓතිහාසික යුගයේ සිට මෑත කාලීන යුගය දක්වා හඳුනාගත හැකි ය.

අරමුණු

මෙම පර්යේෂණයේ අරමුණ වශයෙන් අලව්ව ප්‍රාදේශීය ලේකම් කොට්ඨාසය තුළ වන ප්‍රාග් ඓතිහාසික යුගයේ සිට මහනුවර රාජධානි සමය දක්වා කාල පරාසය තුළ වන මානව මැදිහත්වීම් සඳහා භූ දර්ශනය කෙසේ උපයෝගීකර ගෙන ඇතිදැයි හඳුනාගැනීම සඳහා පුරාවිද්‍යාත්මක හා භූ භෞතික සාධක මත පදනම් ව කරුණු අනාවරණය කරගැනීම ය.

ක්‍රමවේදය

මෙම කරුණු අනාවරණය කරගැනීම උදෙසා පූර්ව පර්යේෂණ අධ්‍යයනය සාහිත්‍ය මූලාශ්‍ර අධ්‍යයනය පුරාවිද්‍යාත්මක මූලාශ්‍ර අධ්‍යයනය සිදු කරන ලදී. පුරාවිද්‍යාත්මක සාධක අනාවරණයකර ගැනීම සඳහා අධ්‍යයන කලාපයට අයත් ග්‍රාම සේවා වසම් ඔස්සේ ගවේෂණ දියත්කරන ලදී.

ප්‍රතිඵල සාකච්ඡාව

මෙහි ප්‍රතිඵල සාරාංශ ගත කිරීම තුළින් භූමි පරිභෝජන රටාවන් ප්‍රාග් ඓතිහාසික මානවයාගේ ක්‍රියාකාරකම් සඳහා පරිසරයේ උපයෝගීතාවය

හඳුනාගැනීම සඳහා හක්බෙලි කන්ද ප්‍රාග් ඓතිහාසික ජනාවාසය වැදගත් වන අතර මෙහිදී ගල් ලෙනක් කෙසේ සිය වාසස්ථාන ලෙස සුදුසු පරිදි මානවයා සකස් කර ගත්තේ ද යන කරුණට අදාළ ව සාධක රැසක් හඳුනාගත හැකි විය. පාරිසරිකමය සාධක අනුව බලන කල ආහාර සහ ජල අවශ්‍යතා මනාව සපයා ගත හැකි ස්ථාන අලලා සිය වාසස්ථාන ඉදිකර ගැනීමට අතීත මානවයා පෙළඹුණු ආකාරය මෙම කරුණු ඔස්සේ හඳුනාගත හැකි විය.

මෙයට පසු ව බුදු දහම මෙරට ස්ථාපිත වීමෙන් අනතුරුව විහාරාරාම ඉදිකිරීමේදී උස් භූමි හා කඳු ශිඛර ආශ්‍රිත ව ලෙන් ආරාම ඉදි කිරීම හඳුනාගත හැකි ය. මාඔය ආශ්‍රිත කලාපයේ ඇති වැදගත් ස්ථාන වශයෙන් ගනේකන්ද රජමහා විහාරය, ,මඩවල විහාරය, ,හක්බෙලි කන්ද ලෙන් ආරාමය වැනි ස්ථාන සුවිශේෂී වේ. මෙහිදී අනුරාධපුර යුගයෙන් පසුව හඳුනාගත හැකි අනෙකුත් යුගයන් හි සාධක මෙම විහාරාරාම ආශ්‍රයෙන් අඩු වැඩි වශයෙන් හඳුනාගත හැකි ය. මෙයට අමතර ව පාරිසරික හා භූ දර්ශනය යන සාධකයන් ට අනුව කරුණු අනාවරණය කරගැනීමේදී කිරීමේදී සාම්ප්‍රදායික ගම්මාන හා කර්මාන්ත බිහිවී එම සම්ප්‍රදායන් ව්‍යාප්ත වන ආකාරය හඳුනාගත හැකි ය. එ බදු සාම්ප්‍රදායික ලක්ෂණ ප්‍රකට කරන ගම්මානයක් වශයෙන් ගලතරේ පුරාණ ගම්මානය පෙන්වාදිය හැකි ය.

කෘෂිකාර්මික කටයුතු වලදී වාරි කර්මාන්ත බිහිකිරීමට භූ දර්ශනයේ උපයෝගීතාවය මනාව යොදා ගත් බවට සාධක ද මාඔය නිම්නයේ අධ්‍යයන ක්‍ෂේත්‍රය තුළින් හඳුනාගත හැකි ය. එමෙන්ම එම පාරිසරික සාධක උපයෝගීකර ගනිමින් විවිධ වාස්තු විද්‍යාත්මක නිර්මාණ සිදුකිරීම ද හඳුනාගත හැකි ය.

උක්ත දක්වන ලද ආකාරයට මෙම කලාපය ආශ්‍රිත ව ප්‍රාග් ඓතිහාසික යුගයේ සිට ඓතිහාසික අවධියන් ඉන් පසු කාලීනවත් භූ දර්ශනය හා පාරිසරික සාධක අතීත ජනාවාසකරණ කටයුතු සඳහා මනාව භාවිත කර ඇති බවට සාධක රැශියක් මෙම පර්යේෂණයේ දී අනාවරණය කර ගැනීම ට හැකි විය.

මූලය පද

භූ දර්ශනය, වාස්තුවිද්‍යා නිර්මාණ, ජනාවාසකරණය, පාරිසරික සාධක, මාඔය දකුණු නිම්නය

ආශ්‍රිත ග්‍රන්ථ

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2002, *වයඹ පළාතේ පැරණි ස්මාරක*, පුරාවිද්‍යා දෙපාර්තමේන්තුව

¹ පුරාවිද්‍යා හා උරුම කළමනාකරණ අධ්‍යයනාංශය , ශ්‍රී ලංකා ලරජරට විශ්ව විද්‍යාලය ශ්‍රී ලංකාව ග

ආරෝග්‍ය ශාලාව හා බැඳි පාරිසරික උපයෝගීතාව(මිහින්තලය පැරණි ආරෝග්‍ය ශාලාව ඇසුරින් සිදුකරනු ලබන පාරිසරික පුරාවිද්‍යා අධ්‍යයනයක්)

දීර්ඝ සාරාංශය

එච්.එම්.එන්. තාරුකා හේරත්¹, ජී.ඩී.ආර්. පියුමාලි සෙනවිරත්න

හැඳින්වීම

ශ්‍රී ලංකාවේ ස්වස්ථාව පිළිබඳව විවිධ මූලාශ්‍රයන් මගින් කරුණු හෙළිකර ගත හැකිය. ඒ අතර වංශ කතා ශිලා ලේඛන මෙන්ම පුරාවිද්‍යාත්මක පුරාණ මූලාශ්‍රයෝද වෙති. ලංකාවේ විවිධ ස්ථානවලින් හමුවන පැරණි රෝහල් පිළිබඳව සාක්ෂි මෙරට පුරාතනයේ සෞඛ්‍ය ක්‍රියාවලිය සම්බන්ධයෙන් වන ප්‍රධානතම පුරාවිද්‍යාත්මක සාක්ෂියයි. පුරාතන පරිසරය හා බද්ධ වුණු ක්‍රියාවලියන් මෙම පැරණි රෝහල් ආශ්‍රයෙන් පැවති බව හඳුනාගැනීමට පුළුවන.

අරමුණු

මෙම පර්යේෂණයේ ප්‍රධාන අරමුණ වන්නේ මිහින්තලේ පැරණි ආරෝග්‍යශාලාව හා බැඳි පාරිසරික උපයෝගීතාවය හඳුනාගැනීම වේ. සෙසු අරමුණු ලෙස විවිධ කාර්යයන් සඳහා පාරිසරික සම්පත් උපයෝගී කර ගැනීමට බලපා ඇති සාධක විමසා බැලීම අපේක්ෂා කෙරේ.

පර්යේෂණ ක්‍රමවේදය

මෙම පර්යේෂණය සඳහා මූලාශ්‍ර අධ්‍යයනය හා ක්ෂේත්‍ර ගවේෂණය යන ක්‍රමවේදයන් දත්ත රැස්කිරීම සඳහා යොදාගැනිණ. එසේ රැස්කරගන්නා ලද දත්තයන් පරිසරය හා බද්ධව විශ්ලේෂණය කිරීම සිදු කරන ලදී. දත්ත ඉදිරිපත් කිරීමේ දී ඡායාරූප හා දත්ත වගු භාවිත කිරීම අපේක්ෂා කෙරේ.

ප්‍රතිඵල සාකච්චාව

ක්‍රි:ව අට වන සියවසෙහි II වන සේන රජු විසින් පැරණි ආයුර්වේද රෝහල ඉදිකර තිබේ. මිහින්තලයේ වැඩ විසූ 2000 ක් පමණ භික්ෂුන්වහන්සේලාහට සෞඛ්‍ය පහසුකම් සැලසීම උදෙසා මෙම ගොඩනැගිල්ල ඉදිකර ඇත. දිගින් හා පළලින් මීටර් 118.6 x 97.6 ක විශාල වූ ආයතන වතුරසාකාර ගොඩනැගිල්ලක් වූ මෙහි මැද මිදුලක් ද එහි මධ්‍යයේ ටැම්පිට විහාරයක මෙන් බුද්ධ ප්‍රතිමා ගෘහයක් ද විය. ප්‍රධාන ද්වාරය දකුණු දිගින් සහ අනුද්වාර දෙකක් ඊසාන දිගින් පිහිටා තිබේ. සෙසු පැරණි රෝහල්වල ව්‍යුහයට සමානවන මෙහි මැද මිදුලට සහ බුදු මැදුරට මුහුණලා රෝගීන්ගේ ගිලන් තේවාසික කුටි පිහිටුවා තිබේ. කුටීර දෙකකට එක් පියගැට පෙලක් යොදා මැද මිදුලට පිවිසිය හැකිය. ප්‍රධාන ගොඩනැගිල්ල පිටත හා ඇතුළු යන මණ්ඩප දෙකකින් යුක්ත වේ. පිටත මණ්ඩපය ඇතුළු මණ්ඩපයට වඩා විශාලවන අතර මධ්‍යයේ ඇති දොරටුවකින් විවෘත මණ්ඩපයට පිවිසිය හැකිවේ. විවෘත මණ්ඩපයේ නැගෙනහිර භාගයේ

මුළුතැන්ගෙය විය. මුළුතැන්ගෙයට ඉදිරියෙන් පිහිටුවා ඇති ගල් කණු මගින් ඉදිරියට පියස්සක් පැවතිබව සිතිය හැක (ගමගේ, 2004). වෙදහලේ දකුණු පස කුටීරයේ ජන්තාසරයකි. එහි මධ්‍යයේ අවකාශය සහිත භූමියේ විශේෂයෙන් සැකසූ ස්ථානයක ඖෂධ යුෂ සහිත උණුදිය සහ සිසිල් දියෙහි රෝගීන් ගිල්වා තැබීමෙන් හෝ නැහැවීම මගින් ප්‍රතිකර්ම කළ ක්‍රමයක් සහ ඇඹරුම් ගල් මගින් විවිධ ඖෂධ වර්ග නිෂ්පාදනය කළ බවත් පැහැදිලිය (ලගමුව, 2014).

මෙම ස්ථානය හඳුනාගත හැකි හොඳම ලක්ෂණය වනුයේ එහි එක් කෙළවරක දක්නට ලැබෙන බෙහෙත් ඔරුවයි. පුද්ගලයෙකුට ගිලා බැස වැතිරෙන්නට හැකි ආකාරයෙන් මෙම ඔරුව නිර්මාණය කොට තිබේ. මෙම ආරෝග්‍යශාලාව කරවීමේ ගෞරවය හිමිවන්නේ ක්‍රි.ව. නව වන සියවස පමණ මෙරට පාලනය කළ දෙවන සේන රජතුමාටය. ඒ පුවත මහාවංශයේ 51 වන පරිච්ඡේදයේ 73 වන ගාථාවේ සඳහන් ය. ඒ “ වජ්ජසාලංච කාච්ඡි චේතියම්හි ගිරිමිහිසෝ...” යනුවෙනි. වර්තමානය වන විට මෙහි හඳුනා ගත හැකි වන්නේ බිම් සැලැස්ම එක් දොරටුවක් හා කණු කිහිපයක් පමණි. එමෙන්ම මෙහි හතරැස් කාමර කිහිපයක් හා මධ්‍යයේ මළ කිහිපයක් හඳුනාගත හැකි ය. බෙල් මහතා දක්වා ඇති විස්තරයට අනුව දකුණු දිශාවට මුහුණලා ඇති මෙම ගොඩනැගිල්ල බටහිර සිට නැගෙනහිරට දිගින් අඩි 118 අඟල් 06ක් ද පළලින් උතුරේ සිට දකුණට අඩි 97 අඟල් 06ක් ද වේ. නැගෙනහිර, උතුර හා දකුණු දිශාවට ඇති අද්දර බිත්ති එක් පැත්තකට 07 බැගින් කුඩා කුටිවලින් සමන්විත වේ. දෙකෙලවර ඇති කුටි අනෙක් ඒවාට වඩා දෙගුණයක් විශාලය. පිටුපස කුටි 9ක් වේ. වෙදහලට ඇතුළුවන ස්ථානය ප්‍රධාන තැනක් ගනිමින් එහි එක් පැත්තකට කුටි 04 කි වේ. මෙම කුටි සියල්ල මුහුණලා ඇත්තේ ගොඩනැගිල්ලේ ඇතුළු පැත්තට ය. එක් කුටියක් වර්ග අඩි 10ක් වන අතර සෑම කුටියක්ම ඉදිරියෙන් පටු මගක් ඇතිවන සේ ගොඩනැගිල්ලේ බරාදය සකස් වී ඇත. උතුරු නැගෙනහිර දිශාවට මුහුණ ලා තබා ඇති ගල් ඔරුවකි. එය දිගින් අඩි 07 ක් වන අතර පළලින් අඩි 02යි අඟල් 06 කි. එහි වැතිර සිටින්නෙකුට හිස තබා ගැනීමට හැකිවන අයුරින් කොටසක් වෙන්කර කපා ඇත. උරහිස කොටසේ ප්‍රමාණය අඩි 01 යි අඟල් 07 ක් වන අතර පාද කොටස අඩියක් පළල වේ (පරණවිතාන 1962). මෙයට අමතරව තවත් කුඩා බෙහෙත් ඔරුවක් හා ඇඹරුම් ගල් කිහිපයක් දක්නට ඇත. ශාකමය ඖෂධයන් ඇඹරීම, කුඩු කිරීම හා කෙටීමට එම උපකරණ භාවිතා කර ඇත (හේරත්, 2005). ආරෝග්‍යශාලාව අසල කළ කැනීම් වලදී ලෝහ භාවිතයෙන් සකස් කරන ලද ශල්‍ය උපකරණ කිහිපයක් ද සොයා ගෙන තිබේ. ආරෝග්‍යශාලාවේ කටයුතු සඳහා ජලය ලබා ගැනීමේ දී ද නිසි ආකාරව ජල කළමනාකරණය කර ඇත. ආරෝග්‍යශාලාවේ පාරිසරික උපයෝගීතාව පිළිබඳව අවධානය යෙමු කිරීමේ දී ද්‍රව්‍ය උපයෝගී කර ගැනීම, පාරිසරික පිහිටීම උපයෝගී කර ගැනීම, ජල කළමනාකරණය ආදිය සංවිධානාත්මකව සිදු කර ඇත.

සාරාංශය

මිහින්තලය ආරෝග්‍යශාලාව ඉදි කිරීමේ පාරිසරික උපයෝගීතාවය පිළිබඳ විමසීමේ දී භූමිය තෝරා ගැනීම, වෛද්‍ය උපකරණ සකස් කිරීම, ගොඩනැගිලි

¹ පුරාවිද්‍යා හා උරුම කළමනාකරණ අධ්‍යයනය , ශ්‍රී ලංකා ලරජරට විශ්ව විද්‍යාලය ශ්‍රී ලංකාව ග

සකස් කිරීම හා ඔෟෂධයන් භාවිතා කිරීමේ දී ස්වභාවික පරිසරය නිසි අයුරින් කළමනාකරණය කර ඇත.

මුඛ්‍ය පද

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Assessment of Indigenous knowledge on Environmental change in the North Central Province of Sri Lanka

Extended Abstract

RDHP Senanayaka¹

Background

“Climate change is the change in climate attributed directly or indirectly to human activity which, in addition to natural climate variability, is observed over comparable time periods” (IPCC, 2007).

The term “climate change” is used with different meanings and perspectives. In some cases, it may refer to all environmental change include natural variability. It is most useful to think of climate change as one of several symptoms of human-produced environmental change with both global and local perspectives. A global perspective is appropriate in recognition of the global interactions involving the component physical systems fundamental to climate change.

Indigenous knowledge can be defined as “A body of knowledge built up by a group of people through generations of living in close contact with nature” (Johnson, 1992).

Indigenous people have a broad knowledge of how to live sustainably. However, formal education systems have disrupted the practical everyday life aspects of indigenous knowledge and ways of learning, replacing them with abstract knowledge and academic ways of learning. Today, there is a grave risk that indigenous knowledge is being lost and, along with it, valuable knowledge about ways of living sustainably.

By the way, the research also depends on the problem statement. According to that, the researcher was selected this topic area to get understand about the environmental change through indigenous knowledge to manage the environment properly. And also to evaluate the past and present environmental change through the people’s knowledge.

Due to the literature review can be obtained global perception about the environmental change and indigenous knowledge. When using the literature

review researcher can be assessed the indigenous knowledge on environmental change in the North Central Province.

Objectives

The overall aim of the study is to assess of indigenous knowledge on environmental change in the North Central Province of Sri Lanka. Specific objectives of this research are to identify the causes, effects and the nature of climate change, to identify the importance of indigenous knowledge in environmental change studies and to identify the important elements of indigenous knowledge which would be valuable for climate change management.

Methodology

This study was based on literature relevant to the objective. Both of primary and secondary data also used for this study. Primary data was collected by field observation using questionnaire and interview. The researcher collects information from the people who aged more than 60 years old. As secondary data magazines, newspapers and research reports were used. MS Excell and SPSS were used to analysis the data.

Results

Human’s activities are mainly caused to environmental change. “Climate change is the change in climate attributed directly or indirectly to human activity which, in addition to natural climate variability, is observed over comparable time periods” (IPCC, 2007). Indigenous knowledge can be defined as “A body of knowledge built up by a group of people through generations of living in close contact with nature” (Johnson, 1992). According to above definition it is able to recognise that the indigenous people have broad knowledge of how to live sustainably.

The study basically consider with assess of indigenous knowledge on environmental change in the north central province of Sri Lanka. The forefathers in North Central Province paid serious attention on the using technologies of cascade system and tank ecosystem in formulation of policies to adapt to climate change in the North Central of Sri Lanka (Jayasundara, 2009).

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Conclusion

According to this survey the researcher could realize that the environmental problem is a worldwide problem. It was not a natural phenomenon. People are creating this problem in day by day. Therefore, the indigenous knowledge is specific study area of environmental change. When using the indigenous knowledge researcher can obtain most appropriate adaptation methods for environmental change. By the way, the researcher basically consider with assess of indigenous knowledge on environmental change in North Central Province of Sri Lanka.

Recommendation

This literature review shows that the Indigenous knowledge is a specific study area about environmental change. It can be introduced most appropriate adaptation methods to the people rather than scientific study.

Key word- Indigenous knowledge, effects, climate change

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Examining the potential of indigenous knowledge for conservation of biodiversity in Sri Lanka

Extended abstract

HAANK Hettiarachchi¹

Background

Over centuries, human being is facing substantial challenges to perpetuate and nurture the environment which results from the increase of consumerism and the development of a nation. Biodiversity has emerged at the centre of one of the most contentious global debates of this century. Sri Lanka is regarded as one of the hot spots of biodiversity. Sri Lankans have a strong traditional culture in the conservation of nature. However, recent environmental change is affected to the loss of biodiversity. Lack of the knowledge and attitudes about protection of nature aggravate the situation. Further, Sri Lanka possesses long history with indigenous knowledge and valuable techniques for conservation of nature. Indigenous people with a historical continuity of resources use practices often possess a broad knowledge base of the behaviour of the complex ecological systems on their own localities. This knowledge has accumulated through a long series of observations transmitted from generation to generation. . This argument is closely related to the question of how biodiversity and traditional knowledge among indigenous people could establish meaningful collaboration towards biodiversity conservation in Sri Lanka.

Ancient people always depend on the environment. It is the core of their life. There are historical evidences to support the fact that the ancient rulers of Sri Lanka have taken steps to preserve the environment, including its flora and fauna. Use of Indigenous knowledge is a vital recourse in future way of the country. Indigenous knowledge and biodiversity are complementary phenomena essential to human development. Therefore, that interrelationship between indigenous knowledge and bio diversity are vital for the conserve the threaten medicine plants in Sri Lanka. The concept of Maha mega Wana is suggested that in meeting the requirements there would be a system for regeneration of the plant communities

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Objectives

General objective of this study was to examine one of the concepts of indigenous knowledge with potential for conservation of bio diversity in Sri Lanka, to give special attention for the conservation of medicine plants. Particularly, the “Maha Megha Wana” (Rain cloud Park concept).

Specific objectives of this study were to identify values of medicine plant species in ancient Sri Lanka, to describe the indigenous practices contributing to biodiversity conservation in the area, to identify that the best conservation method of medicine plants, Elicit information on perceived status and challenges to the use of indigenous knowledge in biodiversity conservation, to assist the government, policy makers and other stakeholders in designing and implementing appropriate programs towards efficient and effective biodiversity conservation framework.

Methodology

This study was based on literature to the objective and followed methodology of conducting thematic analysis. As well as secondary data was a used historical book like Mahwamshaya. The main references were confined to the books, journal articles and intellectual contributions which related to biodiversity, indigenous knowledge (IK), history of other relevant areas.

Results

This research identified values of medicine plant species in ancient Sri Lanka, Identified the indigenous practices contributing to biodiversity conservation in the area and found that the best conservation method of medicine plants through literature reviews.

Conclusion & recommendation

Biodiversity also contributes to humankind through stabilizing effect on the environmental; an ecological function that is so crucial in maintaining and preserving the survival of many living species that form our biological heritage. Analysis of information reveals that the indigenous hospitals were attached to the Buddhist temples and the large quantity and diversity of medicinal plants and other resources were found in the park (Uyana) around the temple.

It is suggested that in meeting the requirements there would be a system for regeneration of the plant communities. This concept can be applied for conservation of threatened species and medicinal

plants with high demand as an ex-situ conservation strategy. Therefore, it can be concluded that Buddhist temple lands at present around the country can be used for biodiversity conservation and augmentation.

Keywords: diachronic observation, enhancing bio diversity, time tested, belief system, community-based.

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Lifestyle of Vedda's community and environmental change

Extended Abstract

RMSD Rathnayake¹

Background

Sri Lanka's Aborigines', or the Veddha's meaning "people of the forest" of Sri Lanka has a history much older than prince Vijaya's landing in 5th century BC and the origins of the Sinhala race. Archaeological evidence suggests that modern Veddha's Neolithic ancestors inhabited this island as far back as 10,000 BC with. Once roaming the Great Plains' of the north central region to the central mountains, today the remaining Veddha population are confined to Dambana which is close to Maduru Oya forest (Wanigasekara 2004). According to the Seligmanns, Bintenne Veddas lived both in permanent villages of up to 40 families and in temporary settlements, near their cultivation plots, which contained Between 1 and 5 families of varying size (www.encyclopedia.com). Present vadda's people lifestyle changed than past years. Between 1977 and 1983 under the Accelerated Mahaweli Development Project and colonization schemes, approximately 51468 hectares were turned into a gigantic hydroelectric and irrigation project. These problems began with Maduru Oya irrigation project. Then they lost their natural settlements. Today they have to face many problems.

Objective

Vedda's community is a very important tribe in Sri Lanka. However, it seems that they are gradually deviate from their original cultural settings. This research hoped to study about Sri Lankan traditional people's change with environmental change and make recommendations to ensure their continuous existence, to study about the causes to reduce Vadda's population and explore about impacts to the environment by reducing Vadda's community.

Methodology

This research was conducted in Dambana village in Mahiyangana town area. Basically used primary and secondary data for this research. As a primary data, collection method field survey, interview, and questionnaires used to collect data. Filled 25 questionnaires from the villagers and interviewed the Vedda's people in the village. Then, used analyzed the data and used charts, tables to present data. Books, Newspapers, Magazines Existent reports, Internet were used as a secondary data collection method. Those were the houses to study Vedda's people lifestyle and environmental change.

Results

This study attempted to explore the relationship between the lifestyle of Vedda's community and environmental change. This study found many reasons to reduce their community. 18 households are living inside the Maduru Oya forest. 7 households are living outside of the Maduru Oya forest. Mainly, they lived from Chena cultivation. Still, 8% people live from hunting. In this study, Vedda's people community, people said many reasons to reduce their community. Because of these reasons it reduces rethe Vedda's tribe and changes their lifestyle. Better as environment also had changed than previous years.

Conclusion & Recommendations

They want to have their independent to live freely in the forest. As well as, limit the tourist people and establish manners to control the tourist people's bad behavior. Apply rules and regulations to who cheat the other people acting as a Veddas people. It is better to want create an awareness program for changing the Attitudes of young vedda's people. As well as carry out awareness programs to educate the general public about ancient people and the environment. Their lifestyle is changing. Subsequently, the creation of the Maduru Oya National Park deprived the Veddhas their last hunting grounds.

Keywords: Vadda's people, Environmental Change, community

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Converting manufacturing process in to green: A case study from the tea industry in Sri Lanka

Extended Abstract

MDMM Jayarathne¹, DM Jayasena

Background

Green manufacturing Concept refers to lessen the impact of the manufacturing process on the environment. A number of principles have been outlined such as reduction of energy and resource use, reduction of material waste and emissions, use of recyclable materials, fewer manufacturing steps, new manufacturing technology, environmental training (Porter & van der Linde, 1995). This research focuses on implementing green manufacturing concepts in medium scale tea industries.

Objectives

Objectives of this research are to find methods, practices, techniques: to efficiently use energy, water, and other resources, to reduce waste generation, pollution and environmental degradation, to reduce unnecessary costs, to increase quality of the tea production, to protect occupant health and safety in the tea manufacturing process.

Methodology

The study has used the case study approach to collect the required data from a tea factory, after observing five low grown orthodox black tea manufacturing factories. The main tool used for this study is the material and energy flow analysis. The study mainly relies on secondary data and primary data. The secondary data were obtained from 2011 to 2016 through factory electricity bills, factory tea book, tea market reports on the internet, published and unpublished reports of tea research Institutes in Sri Lanka, Journal articles. The primary data were collected through observing tea factories and conducting in depth discussions with the factory officers and employees.

Results

The descriptive analyses have determined the following significant problems:

- Productivity of made tea shows downward trend over the time and it denotes raw material wastage.
- There is a gap between productivity of made tea and graded tea. The fibers and stakes are the major wastes generated in the grading process.

The observations have determined the following significant problems in the industry:

- Withering process consumes high electricity due to no control over the speed of motors.
- They do not use a displayer in the withering process to notice start and end timing, turning and mixing times as well as hydrometer readings.
- All the hydrometers are out of date.
- Green leaves wastage occurs in the rolling process as they move the leaves manually.
- This process also consumes high electricity as it repeats the process when the sizes of the particles are large.
- Fermentation process has high water usage due to temperature inside the factory.
- Drying process generates boiler ash, heat, dust, and emits SO₂, CO₂.
- For lighting they use compact fluorescents.
- Food hygiene practices cannot be seen in the manufacturing process.

Conclusions & Recommendations

Electricity usage can be reduced using following equipment, methods and systems.

- Variable speed motors
- Power factor correction capacitors
- Variable frequency drivers
- By replacing LED bulbs instead of compact fluorescents
- Through a well-planned production schedules
- Net metering system can be used to generate electricity using solar panel

To reduce thermal energy requirement for the tea dryer:

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- Wood chips can be introduced instead of wood logs, as a fuel for the drier
- Solar thermal energy is an economically preferable alternative when compared to fuel wood combustion

During sorting, fibers (stake) are produced. Those fibers can pulverize and recycled in process as the re-conditioner. Some portions of the denatured wastes can be used as fertilizer for cultivation. Conveyers can be used to move raw material from one stage to another without any waste.

To reduce water consumption

- Heat prevailing blocks can be used instead of tar ground around the factory

Employees must wash their hands and enter the production facility and then wear appropriate uniforms, gloves, mask and caps for their safety as well as to improve the quality of the product.

Keyword: Green Manufacturing, Tea Industry, Energy Consumption, Water consumption, Waste generation

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Environmental communication for mangrove restoration and conservation: A case study in Anaiwasala a fishing village in Kalpitiya

Extended abstract

MDKL Gunathilaka¹

Background

Mangroves are confined only to a narrow strip along the coastal belt including lagoons and estuaries in Sri Lanka. Environmental communication has been played a major role in mangrove restoration and conservation in Puttalam estuary where one of the survived restored mangrove areas exists. Anaiwasala is a fishing village located in Kalpitiya peninsula where the 90% of replanted mangroves are survived (Ranasinghe, 2012). Technically restored mangroves have not received regular observations and some of socio-economic factors affect for the destruction of restored mangroves in Anaiwasala (Gunathilaka, 2016). As a result, the environmental communication process becomes failure. Therefore, it is important to improve the environmental education and communication to protect both dependents and the ecosystem.

Objectives

Mangroves as an important ecosystem supply all forms of ecosystem services to the villagers in Anaiwasala. As a fishing village the education level of residents are generally poor. The aim of the study is to evaluate the contribution of environmental communication on mangrove restoration and conservation in Anaiwasala.

Methodology

The study is mainly based on primary data obtained by conducting a questionnaire survey based on the random sampling method. The sample size is 30. Field survey was carried out to find out the diversity and success of restoration efforts. Secondary data were collected using details of past restoration programs. Data were analyzed qualitatively and quantitatively.

Results

The periphery along the lagoon in the study area had not much mangroves in the past. Mangrove along the periphery of the lagoon are recently restored mangroves. Only Rhizophora species are selected for mangrove restoration in Anaiwasala. As a perfect salt tolerant species Rhizophora are used to select for restoration. Because of this there is no diversity of mangroves in the area. Rhizophora species are the most important species to the village as it supplies a breeding ground for crustaceans, molluscs and much brackish water for fish species.

63.3% of women in households in Anaiwasala have participated in mangrove restoration and conservation programs. Only 52% of participated women have a considerable knowledge on mangroves. Environmental communication on mangroves between stakeholders and women in the area can be seen significantly. But the fishermen or the sole breadwinners of the families are not much concerned on newly planted mangroves as the plants limited to the area for boat yards. According to the freirean perspective (Wekesa and Aswani, 2015) the environmental communication should touch all residents with interpersonal communication not only group communication. Production of mangroves and socio-economic variables are the main factors to participate for such programs while knowledge and conservation on mangroves are not affecting for the participation. 99% of residents are fishermen and their children also become fishermen. 83.3% of residents in Anaiwasala only have secondary education between grade 6 to grade 10. Only 10% have sit for ordinary level examination they are not aware on mangroves. The stakeholders currently engaged in the area the National Aquatic Resources Research and Development Agency and Small Fishers Federation in Sri Lanka are playing an important role on mangrove conservation and restoration and the environmental communication is considerably good.

Conclusions and Recommendations

More fishermen have low space for mangroves along the periphery of the lagoon. Therefore, the education level should be expanded by supplying more education facilities to the area to create new job opportunities. The environmental communication should be increased among women

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in the area. The education level affect for high degree of environmental communication and the both stakeholders and participants should have environmental education. As the villagers survive through the ecosystem it is their responsibility to protect the ecosystem. Not only Rhizophora species but also other species should apply for restoration projects otherwise the diversity and the abundance of mangroves will lost.

Keywords: Anaiwasal, Ecosystem, Environmental Communication, Mangrove, Restoration,

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Post evaluation of the resettlement process of Upper Kothmale Hydro Power Project

Extended Abstract

GSP Gunarathne¹

Background

The third largest hydroelectric dam of Sri Lanka, known as Upper Kothmale Hydro-Power project (UKHP) is situated in Talawakele in Nuwaraeliya District of Sri Lanka. The project had a continuous delay since its beginning of 1980's due to various issues. Especially the Environmental Impact Assessment (EIA) process identified key environmental and socio-economic impacts associated with the project in 1994 (Nandalal, 2007). The issues which particularly include the impact on St. Clair's waterfall due to stream flow reductions, social impacts due to resettlement of affected people, possible effects on groundwater due to tunneling, impacts on downstream water usage due to dewatering of streams, and impacts on biodiversity (Kodithuwakku and Moonesinghe, 2004). Resettlement is an important as well as a controversial process in any development project. There were huge resettlement issues related to UKHP. Construction work on the project then began in 2006 and is completed by the end of 2011 less than 6 year period. Therefore, it is more important to empirically examine the impacts of the project after implemented. With this background, this study mainly focuses on assessing the impacts of the resettlement process.

Objectives

The general objective of this study is to assess the impacts of resettlement process of UKHP. Specific objectives of this study are; to explore the issues after the resettlement process, to identify the satisfactory level of the affected people on infrastructure development as a part of the resettlement process which was created by the UKHP.

Methodology

Both of primary and secondary data were used for this study. Primary data were collected by field observation and surveying 45 households out of

497 households resettled by the project (CEB, UKHP).

Secondary data were collected by CEB reports, CEA reports and internet websites were used. Descriptive statistical methods; Graphs, charts, tables and percentages in SPSS were used to analysis the data.

Results

The field survey focused on 3 ethnic groups, Sinhala, Tamil, and Muslim. According to major impacts of the resettlement process, surveyed data reveals that 66.7% of household properties were damaged. However, 73.3% of people's jobs were not affected because the resettlement process occurred in a very close proximity with compared to their original settlement. 91.1% of student's education was not affected because of the project.

According to the satisfactory level of the respondents on new infrastructure facilities provided by UKHP; power supply, water supply, transport, educational, health and recreational facilities, 28.9% of affected people are strongly satisfied, 64.4% of people are satisfied and 6.7% of people with the ideas that have no chance on the former indicated infrastructure facilities.

According to the public attitudes on the compensation they received, 33.3% of affected people hadn't got compensation and 66.7% of people had received, on the other hand, 62.2% of people who got their compensation aren't fully satisfied with the amount which they had paid, but 37.8% are satisfied.

Conclusion and Recommendation

According to this field study, the researchers identified that there are pros and cons of the UKHP under resettlement process. When considering the favorable impacts, many jobs weren't affected; education of the students of the affected families was no harm. Many people are satisfied on the new infrastructure facilities (power supply, water supply, transport, educational, health and recreational facilities) which were served by the project. Most of the affected people had received compensation.

The more properties of the people were damaged but all of them had received new houses and land. Compensations weren't satisfactory according to the public attitudes. However, it is important to note that when considering the whole resettlement process, it is more favorable when it compares with the resettlement process of the other development projects in Sri Lanka.

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There are some recommendations for the resettlements of development projects such as introduce well-planned mechanism comprising all the stakeholders including affected people in order to decide the more appropriate compensation scheme which based on the replacement cost. Otherwise, create an annual evaluation of the impacts of a resettlement process, because those impacts can be changed by time passes, enforce law and policies properly such as Land Acquisition Act, National Environment Act, and National Involuntary Resettlement Policy etc.

Keywords; Resettlement, Infrastructure facilities, Evaluation, Compensation, Resettlement policies

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Short Communication

Topic	Author
1. Impacts of water hyacinth (Eichornia Crassipes) in two selected tanks in Kekirawa DS Division	AGGK Darmarathna Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale
2. Environmental and socio economic Impacts of shrimp farming in Sri Lanka	MPS Thilakarathna Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale
3. නායයෑම හේතුවෙන් ඇති වන සමාජ ආර්ථික හා පාරිසරික බලපෑම පිළිබඳ අධ්‍යයනයක් කැගල්ල දිස්ත්‍රික්කයේ අරණායක ප්‍රදේශය ආශ්‍රයෙන්	එල්.එච්. ජේ. බණ්ඩාර පාරිසරික කළමනාකරණ අධ්‍යයනාංශය, ශ්‍රී ලංකා රජරට විශ්වවිද්‍යාලය
4. Occupational health hazard of agricultural workers	PMGSS Subasinghe Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale
5. Issues of solid waste management in municipal councils: A case study from Kurunegala district	KPC M Pathiraja Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale
6. Effect of climate on agriculture in Srilanka	KSA Karunadhipathi Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale
7. Barriers of organic agriculture In Eppawala	GMDD Jayathissa Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale
8. වී වගාව නිසා පරිසරයට සිදුවන බලපෑම පිළිබඳ අධ්‍යයනයක් දේවනුව ව්‍යාපාරය ඇසුරින්	ආර්.එම්. එම්. කේ. බණ්ඩාර පාරිසරික කළමනාකරණ අධ්‍යයනාංශය, ශ්‍රී ලංකා රජරට විශ්වවිද්‍යාලය
9. ගංගා ජලය දූෂණය වීම සහ ඒ ආශ්‍රිත පාරිසරික ගැටලු අධ්‍යයනයක් මා ඔය ඇසුරින්	විශ්මනී දුරේකා බණ්ඩාර පාරිසරික කළමනාකරණ අධ්‍යයනාංශය, ශ්‍රී ලංකා රජරට විශ්වවිද්‍යාලය
10. මා ඔය ආශ්‍රිත වැලි ගොඩ දැමීම හේතුවෙන් ඇති වන පාරිසරික ගැටලු පිළිබඳ අධ්‍යයනයක් ඕපාන වසම ආශ්‍රිත ව	ජී.එම්. ඩී.එන්. ගොඩමුල්ල පාරිසරික කළමනාකරණ අධ්‍යයනාංශය, ශ්‍රී ලංකා රජරට විශ්වවිද්‍යාලය
11. Study of the relationship of climate change	NGCL Gunawardhana

with vector borne diseases	Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale
12. කිරළ කැලේ තෙත් බිම නායනය වීම සඳහා ඒ ආශ්‍රීත ව මානව ක්‍රියාකාරකම් වල බලපෑම අධ්‍යයනය කිරීම	එල්.එල් .ඩී. ප්‍රබෝධනී භූගෝල විද්‍යා අධ්‍යයනාංශය, රුහුණවිශ්ව විද්‍යාලය, මාතර.
13. Inland fishing and rural livelihood: opportunities and threats	IGBU Aththanayake Department of Social Sciences, Rajarata University of Sri Lanka, Mihintale
14. වියළි කලාපයේ ග්‍රාමය වැව් පද්ධතීන් ප්‍රතිසංස්කරණය පිරිමේ අවශ්‍යතාව හා එහි අදාළත්වය කිමුල්වානා වැව හා මඩහපොල වැව යන පද්ධතීන් ආශ්‍රයෙන්	ජී. සී. ඩී. සුජීවා පාරිසරික කළමනාකරණ අධ්‍යයනාංශය, ශ්‍රී ලංකා රජරට විශ්වවිද්‍යාලය
15. Water pollution in the North Central Province	NG Surangika Department of Environmental Management, Rajarata University of Sri Lanka, Mihintale