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Out of the Press

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Peer-reviewed Journal Articles

Effects of fungicide chlorothalonil on freshwater plankton communities: a microcosm study

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Abstract

Direct and indirect effects of the fungicide chlorothalonil on aquatic plankton community structure were investigated by exposing plankton to chlorothalonil concentrations of 0.010, 0.025, 0.100, 0.250 and 1.000 mg/L over 20 days in 18 microcosms (glass tanks having 8 L of pond water). Each treatment was executed in three replicates. Total phytoplankton and zooplankton abundance and chlorophyll-a concentrations in microcosms were measured 5, 10 and 20 days after pesticide exposure. Plankton community and taxa response to pesticide concentrations were analyzed using the similarity of percentages procedure (SIMPER) and one-way ANOVA test. The results of the study indicated that highest concentration levels of chlorothalonil exposure had a significant impact on phytoplankton and zooplankton taxa. Phytoplankton taxa *Amphora* sp. and *Staurastrum* sp. and zooplankton taxa *Moina* sp. and copepod *Nauplius* were highly sensitive to chlorothalonil exposure. Phytoplankton taxa *Mougeotia* sp. increased with increased chlorothalonil (0.1-1.0 mg/L) concentrations, and zooplankton taxa of *Aeolosoma* sp. showed no significant reduction of individuals in response to pesticide exposure. Results showed that pesticide residues have a direct and rapid impact on phytoplankton and zooplankton community structure. Changes in diversity and species composition induced by pesticides indicate the importance of considering indirect effects of pesticides on the ecological food chain in the aquatic environment.

About the Journal

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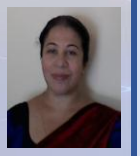

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Book Chapters

DNR

Challenges of Resilience Building Among Traditional Agricultural Communities Displaced by the Landslides

B. M. R. L. Basnayake, D. A. M. De Silva & S. K. Gunatilake

Abstract

Landslides are controversial issues worldwide and cause wide range of socioeconomic issues. The present study was conducted to examine the approaches and challenges faced by traditional agricultural communities in re-building landslide-depredated mountain landscape. Primary data were obtained through field observations, in-depth interviews with key stakeholders of rehabilitation program, and storytelling exercise with the participation of disaster victims of Aranayaka mountain landslide, Sri Lanka. Land use maps of the area highlighted that more than 50% of land utilized for agricultural purposes. Paddy, tea, spices, and Kandyan home gardens were identified as prominent livelihood options. Agriculture operations assured household food and income security. Landslide of 2016 destroyed the entire system, and generations-old farming communities were displaced without any assurance for living. Improper resettlement plans were unable to address the issues of housing, livelihood, and food and income security of displaced people. Unrest, conflicts, trauma, and poverty shock made communities more vulnerable. Employment options shifted from owners of farmlands to daily wage laborers, and most of the females migrated to Middle East as domestic helpers. Land access and resettlement programs fall short of community expectations, with negative impacts on livelihoods of displaced farming community and absence of meaningful involvement by communities in decision-making.

About the Book

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DNR

Displaced Fishermen Off the Coast: Impact of Multiple Hazards on Life Above the Water

Achini M. De Silva, Minura Sandamith, Isuru Wicramarthne, B. M. R. L. Basnayake, Janaranjana Ekanayake, K. B. Seenapatabendige & S. K. Gunatilake

Abstract

The small-scale fisheries (SSF) sector tends to be firmly rooted in local communities, traditions, and values, and SSF contributes about half of fish catches. Study aimed to identify natural versus man-made hazards on displaced fishermen off the coast, perform vulnerability assessment, develop timeline on multiple hazards on coastal livelihood, and develop resilient building mechanism through GIS-based integrated coastal zone management plan. Storytelling exercise performed in 15 FI divisions to collect qualitative data along the multi-functional coast of the Galle district of Sri Lanka. Vulnerability assessment, case study analysis of multiple hazards, GIS mapping, change detection, and spatial modeling are used as decision support resources to develop integrated coastal resource management plan. Fishermen serve as starting point of network of collectors, traders, processors, and institutions while feeding thousands of families. Indian Ocean tsunami displaced fishing communities first and both natural and man-made hazards limit the coastal space for fishers while threatening their livelihood. Blooming coastal tourism added extra pressure on land values, shrinking the coastal land for fishing communities and infrastructure and logistic developments made fishers away from coast. GIS mapping of coastal zone, sourcing local knowledge through stakeholder consultations, was applied to develop participatory integrated coastal zone management plan to secure the coastal space for fishing communities.

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Conference Proceedings

Deleterious Environmental Impacts of Glyphosate Application on Tea (*Camellia sinensis L.*) Cultivation in Sri Lanka

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Abstract

Herbicide use is the most famous method in tea plantations to control weeds due to its cost-effectiveness, less labor requirement, and high efficiency in controlling a wide range of weed flora. Glyphosate, N-(phosphonomethyl) glycine is considered as the most widely used herbicide in the world, which has high efficiency in weed control. Thus, the aim of this study was to determine the persistence of glyphosate in tea leaves and tea soils in herbicide-applied and herbicide-free plots. Further, to determine the levels of Copper (Cu), Zinc (Zn), Iron (Fe), Manganese (Mn), Lead (Pb), and Cadmium (Cd) in tea leaves and tea soils in both herbicide-applied and herbicide-free plots. Glyphosate residue analysis was carried out at the Industrial Technology Institute (ITI), Sri Lanka using the Liquid Chromatography/ Tandem Mass Spectrometry (Triple Quadruple) detection method. The Microwave digestion system and atomic absorption spectrometer (AAS) were mainly used to determine the levels of metal contaminations in tea leaves and tea soils. According to the results, among herbicide-applied and herbicide-free plots, glyphosate was only detected in tea leaves of herbicide-applied plots and the concentration is 0.56 mg/kg. Glyphosate was detected in soils of both herbicide-applied and herbicide-free plots. The glyphosate concentrations in the soils of the herbicide- applied plot are significantly higher than in the soils of herbicide-free plots. Further, Zn, Fe, and Pb levels of soils of herbicide-applied tea plantations are significantly higher ($p < 0.05$) than the soils of herbicide-free plots. The results showed that Pb levels of green leaves and black tea are slightly higher ($p < 0.05$) in herbicide-treated plots. However, glyphosate concentrations in the tea leaves were found to be below the maximum residue limit (1 mg/kg). Overall, the present study gives an idea about the effects of glyphosate application on tea cultivation in Sri Lanka.

About the Conference

International Conference on Environmental Issues and Sustainable Development (EIASD) 2023

2nd & 3rd February 2023

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Why lichens are suitable as bioindicators in the environment?

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Abstract

Lichens are organisms formed due to a symbiotic relationship between a dominant fungus and one or more photosynthetic partners including algae or cyanobacteria. According to recent findings, some lichens are associated with basidiomycete yeasts and diatoms. The unusual biology of the lichen symbiosis makes them particularly sensitive to habitat disturbances or climatic change due to natural and anthropogenic activities and also sensitive to environmental disturbances such as air pollution, heavy metal pollution, radionuclide deposition, microplastic depositions, and acid rains. A good biological indicator for biomonitoring should have sensitivity to environmental changes and accumulative characteristics of environmental pollutants or contaminants. Sensitive biomonitors should show morphological and physiological changes and be used as an indicator of the stress caused by contaminants, and act as early alarm systems. Lichens lack defensive tissues, so they can easily absorb water, nutrients, and gasses straight from the environment. Further, accumulative biomonitors can store contaminants in their tissues and are used for the measurement of the concentration of such contaminants in the environment. In addition, lichen species are more common in any habitat, easily sampled, and low-cost methods are applicable for sampling and analysis. Because of such reasons, lichens have been used as a biological indicator for many studies since the 1800s. Biomonitoring studies using lichens as the biological indicators have increased and widened in terms of various parameters, monitoring techniques, and sampling areas during the last 50 years. Many techniques and discoveries for lichen biomonitoring were found by researchers recently and all these discoveries indicate abundant new opportunities for new research to explore in terms of biomonitoring using lichen as the biological indicator for many aspects.

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