Short communication

Indicator plants of perennial streams: ecological approach for the wildlife management in mining areas

ABSTRACT

Mining activities create lot of ecological imbalance, including destruction of wildlife habitat. It also gives a negative impact on perennial stream. In near future, we have to restore them using ecological keys. Bio – indicator of perennial stream is very important for restoration and act like ecological keys. Keeping this in view, an attempt has been made to enumerate the plant species growing in and around perennial stream of Koira range, Bonai forest division, Odisha, India. Koira range comes under mining impacted areas. Results revealed that about 14 plant species are commonly available in 10 streams of Koira range. Enumerated species could be indicators of perennial stream which will be fruitful for future restoration strategies.

*Keywords***:** Mining activities, perennial stream, Bio- indicator, wildlife management

1. INTRODUCTION

Perennial stream is a stream or channel of water which flow throughout the year. Usually, it is observed in mountainous area, in forest and near the Snow belt. They are very important for environment, wildlife and local communities. They play an important role in providing clean drinking water, recharging ground water, reduction of pollution, protection from flood & erosion and providing habitat for wildlife. These perennial streams in mining areas are going to be dried lead to the destruction of wildlife habitat and reduction of clean drinking water.Drying and extinction of perennial streams creating imbalance in ecological niche which further lead to the negative changes in climate, vegetation destruction and allowing to naturalize the invasive species. Mining activities are also important and can't be stopped, therefore need sound strategies for wildlife management and restoration. In near future, we need to identify some keys as indicator for the restoration of perennial stream in mining areas. Therefore an attempt has been made to enumerate the species mostly available in an around the perennial stream of Koira range, Bonai forest division , Odisha, India. Study area comes under Bonai forest division and enjoy moist and dry deciduous vegetation. The forested areas of Koira

range are home of numbers of perennial stream and wildlife like Asian elephant, Sloth bear, Barking deer etc [1]. The present study highlights the importance of the bio-indicator plants in restoration of perennial stream.

2. METHODOLOGY

The study was conducted in Koira range of Bonai forest division, Odisha, India during the year 2021 -2022. Plant enumeration was done through floristic survey in and around perennial stream and identified by Dr. Sanjeet Kumar, CEO, Ambika Prasad Research Foundation, Odisha, India. The enumerated plants were arranged alphabetically. The plants grow near moist areas as well as in & around perennial stream were classified as partial-indicator.

3. RESULTS AND DISCUSSION

Survey works revealed that about 14 plant species belonging to 11 families like Rutaceae, Rubiaceae, Eriocaulaceae, Euphorbiaceae, Acanthaceae, Verbenaceae, Melastomataceae, Lamiaceae, Polygonaceae, Poaceae and Symplocaceae were enumerated. From which, 4 were shrubs, 6 were herbs, 3 were trees and a grass were reported. It was observed that *Eriocaulon breviscapum*, *Homonoia ripari* and *Polygonum barbatum* growing inside, rocky surface and bank of the perennial streams. It was also noticed that *Melastoma malabathricum* and *Osbeckia stellata* observed at the edges of the streams (Table 1; Plate 1). Very less or few reports are available on indicators as a plant species for perennial streams. Researchers identified the indicators of perennial streams in some areas. The most common indicators are micro invertebrates which found in the bottom and surface of streams, like cadddisflies, damselflies, stoneflies and some aquatic worms; fish and amphibians including tadpole, salamanders, newts etc are also indicators; the particle size of sand also help to identify the source of perennial streams. It can also identify using the evidences of iron-oxidizing bacteria just after about 48 hours of a storm. Some botanical reports are also available. In the year 1988, Kovaichik et al. reported number of shrub like Vine maple, Yellow willow, forbs likes Monk-shood, Queen cup; grasses like Blue wildrie; sages like Green fruited sage etc. from the riparian zone of National Forests of Central Oregon [2]. In the year 2017, Mligo reported 261 plant species of 68 families in Wami river system, Tanzania [3]. In the year of 2020, Gomes et al. reported 24 herbs in ephemeral and

perennial stream of Sabaragamuwa Province of Sri Lanka and Hong Kong of China [4].

Table 1: Water indicator plants in study areas

Botanical name	Common name	Family	Habit	Indicator	Partial-indicator
Acronychia pedunculata	Pani nimba	Rutaceae	Small evergreen tree		✓
Eriocaulon breviscapum	Pani gend	Eriocaulaceae	Aquatic herb	✓	
Homonoia riparia	Pani begunia	Euphorbiaceae	Shrub	✓	
Lepidagathis fasciculate	Rasna	Acanthaceae	Herb	✓	
Lippia javanica	Nagdabana	Verbenaceae	Herb		✓
Melastoma malabathricum	Korali	Melastomataceae	Shrub		✓
Murraya paniculata	Ban mallika	Rutaceae	Shrub		✓
Osbeckia stellata	Rato fula	Melastomataceae	Herb	✓	
Pogostemon quadrifolius	Pathra fula	Lamiaceae	Shrub	✓	
Polygonum barbatum	Bekh ful	Polygonaceae	Herb	✓	
Psydrax dicocus	Karuna	Rubiaceae	Small evergreen tree		✓
Saccharum spontaneum	Kashatandi	Poaceae	Grass		✓
Stachytarpheta cayennensis	Sapura	Verbenaceae	Herb		✓
Symplocos racemose	Lodha	Symplocaceae	Small tree		✓

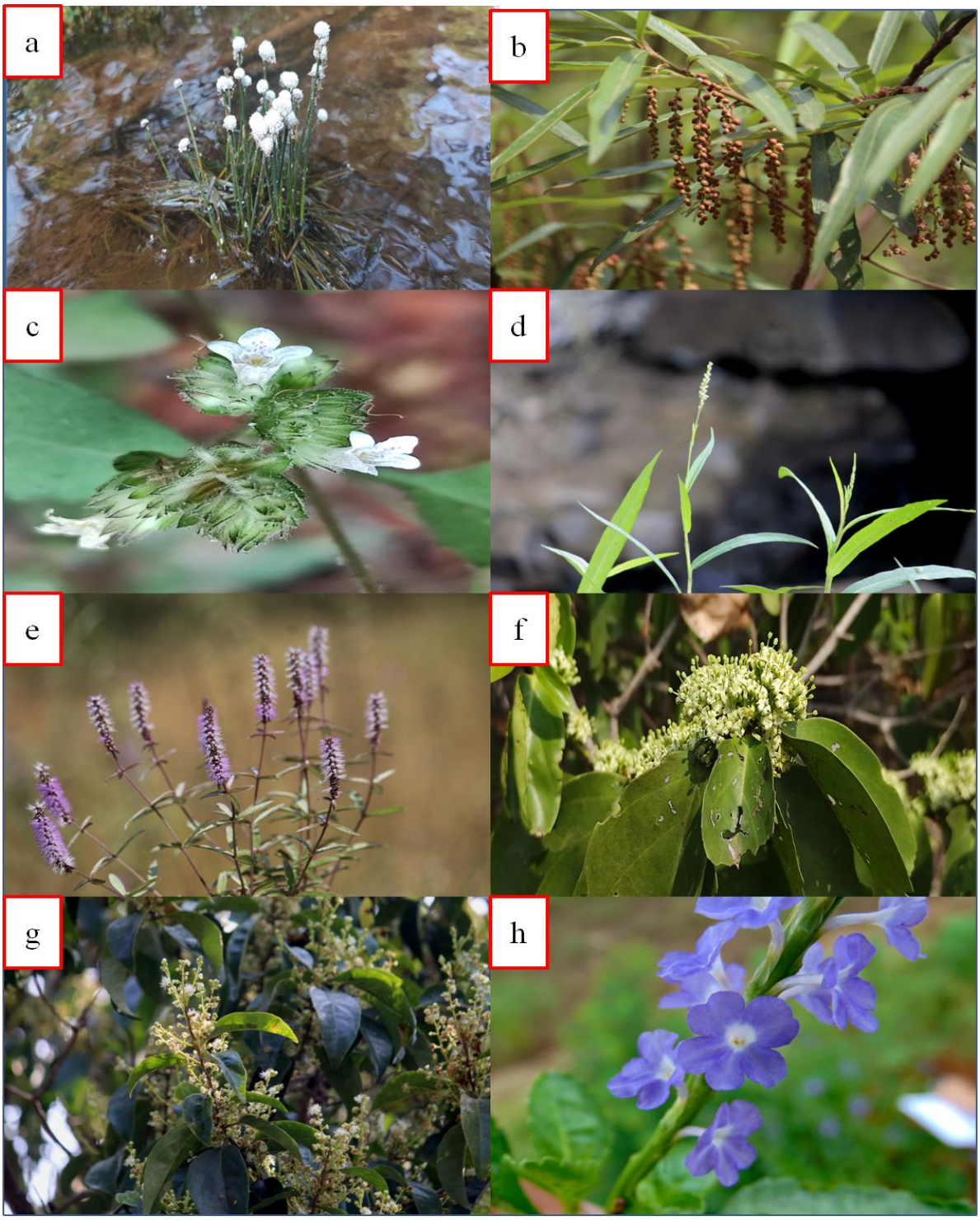

Plate 1: Water indicator plants in Koira range, a) *Eriocaulon breviscapum*, b) *Homonoia riparia*, c) *Lepidagathis fasciculate*, d) *Polygonum barbatum*, e) *Pogostemon quadrifolius*, f) *Psydrax diococcus*, g) *Symplocos racemosa*, h) *Stachytarpheta cayennensis*

Plate 2: Survey works in Koira range, Bonai forest division, Odisha, India

4. CONCLUSION

Mining activities are major reason of distraction of wildlife habitat and drying of perennial streams. In very near future, we will have to restore them throughout the world. For restoration, need the ecological keys. Abiotic & biotic components could be the keys. The present work's aim was to identify the plants under biotic components to make them strong ecological keys for future restoration works. The results revealed that about 14 species are commonly available in & around the perennial streams in study areas. Further need the restoration of enumerated plants near the streams and have to monitor all possible components related to the negative impacts of mining on perennial streams.

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