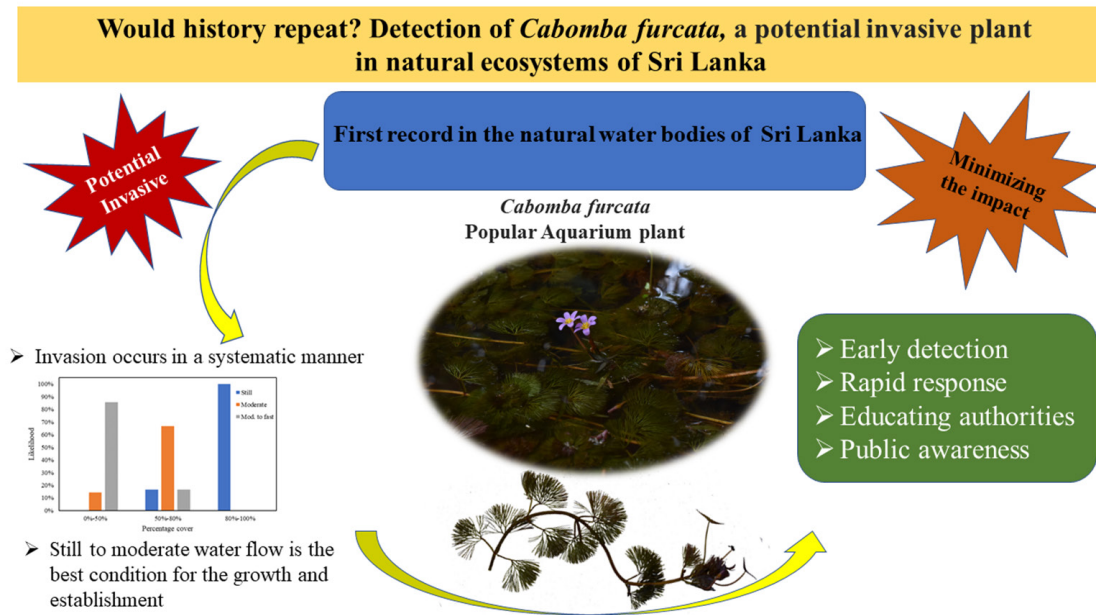


Would history repeat? Detection of *Cabomba furcata*, a potential invasive plant in natural ecosystems of Sri Lanka

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Highlights

- Early detection and rapid response is the most cost-effective method to minimize the damage caused by AIS.
- We report the occurrence and establishment of *C. furcata*, as a potential AIS in the natural water bodies in the wet zone.
- The percentage cover and type of population are associated with the rate of water flow.
- Still to moderate flow is the most suitable condition for the establishment and growth of *C. furcata*.
- The study highlights the risk associated with *C. furcata* and the importance of initiating steps to eradicate it.

RESEARCH ARTICLE

Would history repeat? Detection of *Cabomba furcata*, a potential invasive plant in natural ecosystems of Sri Lanka

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Abstract: Alien invasive species are considered a serious threat to biodiversity, and all nations are gearing towards minimizing their impacts. Early detection and rapid response are identified as one of the most effective methods for minimizing their detrimental impacts. The present study reports the discovery of *Cabomba furcata* Schult. & Schult. f., a potential invasive plant, in the watercourses of Kalutara district, in the wet zone of Sri Lanka. Systematic random sampling was carried out along streams and water bodies where the initial population was detected. During the extensive field survey, in addition to the initially detected location, another location with the infestation was encountered. The distribution, type of the population (linear or clump), and the water flow rate (still to fast) were tested using Runs Test. The association between the water flow and the growth type of the population was tested using the Chi-squared test of independence. Based on the results of the Run's test, the type of the population and the rate of the streamflow were non-random, thus following a systematic behavior. An association ($p < 0.001$) between the flow rate and type of the population was observed where moderate to fast flow rates promote clump growth in *C. furcata*. An association between the flow rate and both percentage cover and type of the population was also observed; still to moderate water flow was identified as the most suitable condition for the establishment and growth. The results indicated that *C. furcata* is well established in the two locations detected, thus posing a threat to the native freshwater aquatics. This information would be an eye opener for the authorities to initiate controlling and eradicating measures immediately. If not, this plant will extend its territory and invade other watercourses of the Kalutara district facilitated by frequent floods.

Keywords: Potential alien invasive species; ornamental aquatic plants; submerged aquatic macrophytes.

INTRODUCTION

Biological invasions are a major concern in biodiversity conservation worldwide. According to the definition put forward by the US government, an invasive species is defined as, “with regard to a particular ecosystem, a non-native organism whose introduction causes, or is likely to cause, economic or environmental harm, or harm to

human, animal, or plant health” (Reaser *et al.*, 2020). These invasive species are an important cause of the biotic homogenization of ecosystems (Houlahan and Findlay, 2004).

Sri Lanka, in particular, has experienced many such invasions in the past that had caused both economic and ecological damage. The majority of the invasive alien plant species have been imported and introduced through agricultural and horticultural practices and have now established themselves in natural, semi-natural, and human settlements in Sri Lanka (MMDE, 2015). One of the well-known aquatic invasive species in Sri Lanka, *Eichhornia crassipes* is believed to be introduced to the country for ornamental purposes in 1905. *Salvinia molesta* is the other widespread aquatic in the National invasive plant list that is said to be introduced in the 1930s for educational purposes (MMDE, 2015). At present, these plants occur in almost all parts of the country, causing serious problems. In addition, Yakandawala and Yakandawala (2007) recorded the occurrence of *Mayaca fluviatilis*, *Ludwigia sedioides*, and *Echinodorus* spp. in the aquatic ecosystems of the Western Province of Sri Lanka, identified as escapees from ornamental aquatic plant nurseries. Adding to this list, Yakandawala and Yakandawala (2011) and Yakandawala *et al.* (2017) record the violet flowered hybrid *Nymphaea* species that was erroneously identified as *N. nouchali* as a potentially invasive plant (later named as *Nymphaea* × *erangae*; Yakandawala *et al.*, 2017) in local water bodies. These invasions, in addition to causing broad detrimental effects such as loss of biodiversity, competition, clogging canals, altering water quantity and water quality, decrease in fish abundance, impact on culture, and aesthetics of the aquatic ecosystems, are capable of hybridizing with the natives causing serious consequences (Yakandawala and Yakandawala, 2011; Parepa *et al.*, 2014). Control of invasive species is a broader topic with different views and strategies. One approach is where we anticipate and thus prevent future invasions by identifying and regulating potentially invasive species through species

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risk assessments and international trade regulations (Humair *et al.*, 2015; MMDE, 2015), while another is early detection and rapid response to invasive species (MMDE, 2015; Reaser *et al.*, 2020).

Cabomba furcata Schult. & Schult. f. belongs to the family Cabombaceae. The genus is represented by six aquatic species in the world; *Cabomba aquatica* Aubl., *C. caroliniana* A. Gray, *C. furcata* Schult. & Schult.f., *C. haynesii* Wiersema, *C. palaeformis* Fassett, and *C. schwartzii* Rataj. The native range of the plants includes tropical and subtropical Central and South America, and the Caribbean. Of these species, *C. caroliniana* is recorded in Sri Lanka as either as an ornamental plant in fish tanks or occasionally as an escapee in ponds and ditches (Dassanayake, 1999). In 2013, Yakandawala *et al.* recorded three species; *C. aquatica*, *C. caroliniana*, *C. furcata*, and two *Cabomba* varieties; *Cabomba caroliniana* var. *pulcherrima* R. M. Harper and *C. caroliniana* A. Gray var. *paucipartita* J. D. van Ramshorst & Florschütz as plants traded in the ornamental aquatic plant industry in the country.

The ornamental aquatic plant industry is a booming trade in the country where a considerable amount of foreign revenue is involved. The total revenue of the aquatic plant trade from 2013 January to 2014 August is reported to be 428,663 US\$ (56,403,023 LKR), while the total quantity exported in the particular period amounted to 53,830 Kg (Jayarathna and Senadheera, 2015). According to Yakandawala *et al.* (2013), 389 plant species are currently trading in the island, of which exotics represent 62%, while natives and endemics represent 9% and 4%, respectively. Further, 3% were cultivated species while the remaining 22% included hybrids/cultivars, plants referred to only by their genus or illegitimate names. Even though Sri Lanka is blessed with a considerable number of native aquatics, which amount to over 370 species (Yakandawala, 2012), the high demand for certain exotic plants in the export market has resulted in importing exotics that are propagated locally and re-exported. During this exercise, some of these exotics have escaped the controlled environment and got naturalized. Once escaped, some of these exotic aquatic ornamentals, commonly referred to as alien plants, have the potential to invade the natural environment posing a detrimental threat to the local biodiversity, agriculture, recreation, and aesthetic quality of water bodies. Sri Lanka has experienced many such escapes and establishment events in the past. The introduction and establishment of invasive species are of increasing global concern (Chandra and Gerhardt, 2008). In addition to the ornamental aquatic plant industry, unregulated e-commerce is partly responsible for the spread of exotics into new environments.

Typically, aquatic plant invasions are unnoticed or overlooked until they are perceived as problematic. Unfortunately, by this stage, plants are virtually impossible to eradicate, and the negative ecological impacts caused by their spread into natural communities are irreparable (Les and Mehrhoff, 1999). Therefore, recording and educating the relevant authorities and public during the early stage of the spread is vital as prevention is better than cure. In

this backdrop, the present study report the first record of *Cabomba furcata* in the natural environment in Sri Lanka, together with its distribution and establishment.

MATERIALS AND METHODS

A heavily infested initial population of a submerged aquatic plant was spotted in a way-side stream during a field visit to Neboda in the Kalutara district in January 2021. The plant species that extensively invaded the stream was approximately identified in the field as a *Cabomba* sp. that has not been previously recorded in Sri Lanka. Hence, samples with flowers were taken to the Plant Systematics Laboratory, Department of Botany, University of Peradeniya to confirm their identification further.

Plant identification

The morphological studies were conducted using visual observations and under the stereomicroscope (LEICA L2), and compared with published literature (Ørgaard, 1991; Siti-Munirah and Chew, 2010).

Field data collection and sampling

The streams and water bodies present in the nearby area of the population that was initially detected in January 2021 were pre-identified using the remote sensing technique, and an extensive field survey was conducted from February to April 2021 along streams and water bodies in the Kalutara Divisional Secretariat Division to record the occurrence of the species.

A systematic random sampling was adopted to collect samples along with the watercourses/streams. The starting point was selected randomly, and samples were taken every 100 m to the upstream and the downstream until no plants of *Cabomba* sp. were recorded. The extent of the spread of the plant population in the water body (in terms of the length (m), width (m), and depth of the water body (m)), percentage of the plant cover and the type of the population (linear or clump) were recorded. The nature of the water flow (from still to fast) was scored visually using a five-point likert scale. The depth of the spread under the water and the depth of the water body was estimated using a scaled stick. The GPS locations of the water bodies/locations with populations of *Cabomba* sp. were recorded and depicted on a map of Sri Lanka using ArcGIS 10.4 (ESRI 2017) and Google Earth. Information about the spread of the plant and the community perception of its spread were collected through participatory discussions held with the local community.

Data analysis

The type of the population and the water flow of the stream was initially analyzed using both numerical and graphical summary measures. The distribution of the clump and linear dispersion (type of the population) and the water flow along the main-stream was tested using a Runs test measured on a dichotomous scale (type of the population as clump or linear dispersion, flow rate as still to fast) to determine if the spread of the plant along the stream has taken place randomly or systematically. The association

between the establishment of *Cabomba* sp. (type of the population and percentage cover) in relation to the flow rate of the stream was tested using the Chi-squared test of independence.

RESULTS

Species identification

The detailed morphological study identified the *Cabomba* species spreading in watercourses of the Neboda area in the Kalutara district as *C. furcata* Schult. & Schult.f. (Cabombaceae). A detailed taxonomic description for the identification of the alien invader is given below (Figures 1 and 2).

Cabomba furcata Schult. & Schult.f.

Synonyms: *C. piauiensis* Gardner, *C. pubescens* Ule, *C. warmingii* Casp.

Morphological features: Growing with submerged and floating leaves. Pedicels and flowers tightly clustered just beneath the surface of the water. Stems olive-green to reddish-brown. Submerged filiform leaves dark purple-green, in whorls of three, at the apex often opposite. During flowering, the apical internodes are very short. Petiole c. 1-2 cm, lamina with linear divisions in one plane, c. 3-4 cm long. Floating leaves peltate, olive-green, sometimes with a dark purple margin, lamina narrowly rhombic or linear to lanceolate, rarely sagittate, 5-20 × 5-17 mm. Pedicels are 2-5.5 cm long. Flowers purplish, 6-12 mm diameter, 5-10 mm long; sepals 3, obovate-elliptic, 5-9 × 2-4 mm, apex obcordate, basal third yellow, distal two thirds purplish red to bluish violet with darker veins, with a darker rim at the margin; petals 3, ovate-oblong, 5-9 × 2-5 mm, base slightly auriculate, the lobes with two yellow, confluent patches, the claw whitish; stamens greenish-yellow, 5 mm, anthers yellow; carpels 2, divergent at maturity. Seeds globose, 1-2 mm diameter, echinate, surface verrucate.



Figure 1: Vegetative habit of *Cabomba furcata*. A. Submerged plant floating just below the water surface, note the submerged filiform leaves and the floating leaves peltate together with the flower; B. Plant mounted in water, note the submerged filiform leaves in whorls of three; Peltate floating leaves towards the apex where the apical internodes are very short; C. and D. Peltate floating leaves, and E. Submerged filiform leaves.

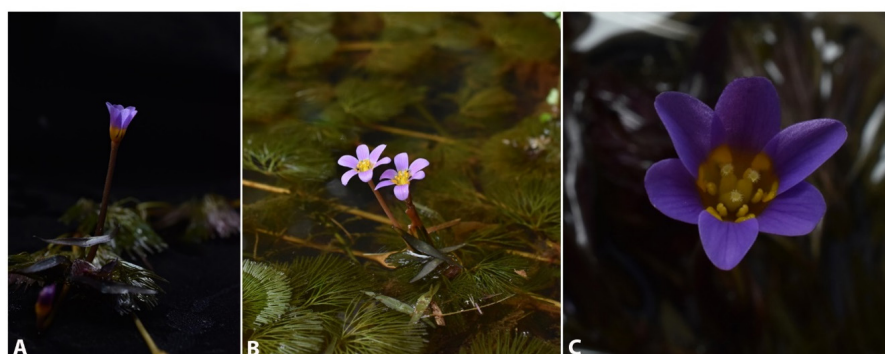


Figure 2: A. Floral habit of *Cabomba furcata*; B. Flowers emerged out of the water surface and C. A closer view of the flower.

Distribution and the assessment of the spread

At the time of the first discovery in a natural habitat in January 2021, *C. furcata* was not apparently at the primary stage of infestation. In addition to the first detected location, several other streams were also identified as invaded in the Naboda area, including the Naboda Wathurana wetland and another location 5.1 km (aerial distance) away from the first site in the Owilana area in the Kalutara district (Figures 3, 4 and 5).

The spread in the Naboda area was severe along the mainstream, a tributary of a major river, 'Kalu-Ganga', with a 100% cover over an extent of more than 2 km (Figures 3 and 4). The other sub-streams that are connected to the mainstream had comparatively fewer infestation. Compared to the spread in the Naboda location, the spread in the Owilana area was less, occurring only in one stream with less than 70% cover and in small to large pools, especially in marshy lands. Therefore, the data collected from the main-stream of the Naboda area was used in the analyses (Figure 3).

Percentage cover

The percentage cover of the *C. furcata* population distributed along the mainstream is illustrated in Figure 6. At the starting point, the percentage cover of the plant was reported as 80% which was found to be zero in 200 m upstream. Towards the downstream, percentage cover remained 80% up to 900 m, and thereafter it increased up to 100% that persisted up to 2.2 km before the mainstream joined the river 'Kalu Ganga'. In the last 1,000 m stretch along the mainstream before meeting the major river, the percentage cover of the plant drastically reduced with no spread observed in the last 100 m. Most of the time, the

percentage cover of the plant along the mainstream was observed above 75%. With respect to the sub-streams, the extent of the spread of the plant population in terms of the length of the cover in all the four sub-streams ranges from 200 - 300 m, and the percentage of cover ranged from 70 - 100% (results not given).

Distribution pattern

The results from the Runs test were statistically significant ($p < 0.001$), indicating that the infestation above 75% is not a random event.

Type of the population

Two types of populations of *C. furcata* were observed as either with clump or linear dispersion (Figures 4B and D). The linear dispersion was more frequent along the mainstream up to 3.3 km representing 33 observation points. When the stream approaches the main river, the dispersion of the population was observed as clumped, which was recorded for 0.7 km representing seven observation points. The length, width, and depth of the spread describe the extent of the plant population and are depicted in the histograms in Figure 7 a, b, and c. Accordingly, 100 m long patches were recorded in 30 locations (Figure 7b), whereas 8 m wide and 2 m deep patches were recorded in 22 locations. The width and the depth of clumps depend on the width and the depth of the stream.

Impact of flow rate on growth and establishment

Runs test on both variables was statistically significant at $p < 0.001$, indicating that both clump and linear dispersions of plant populations and flow rate along the stream occur in a systematic manner.

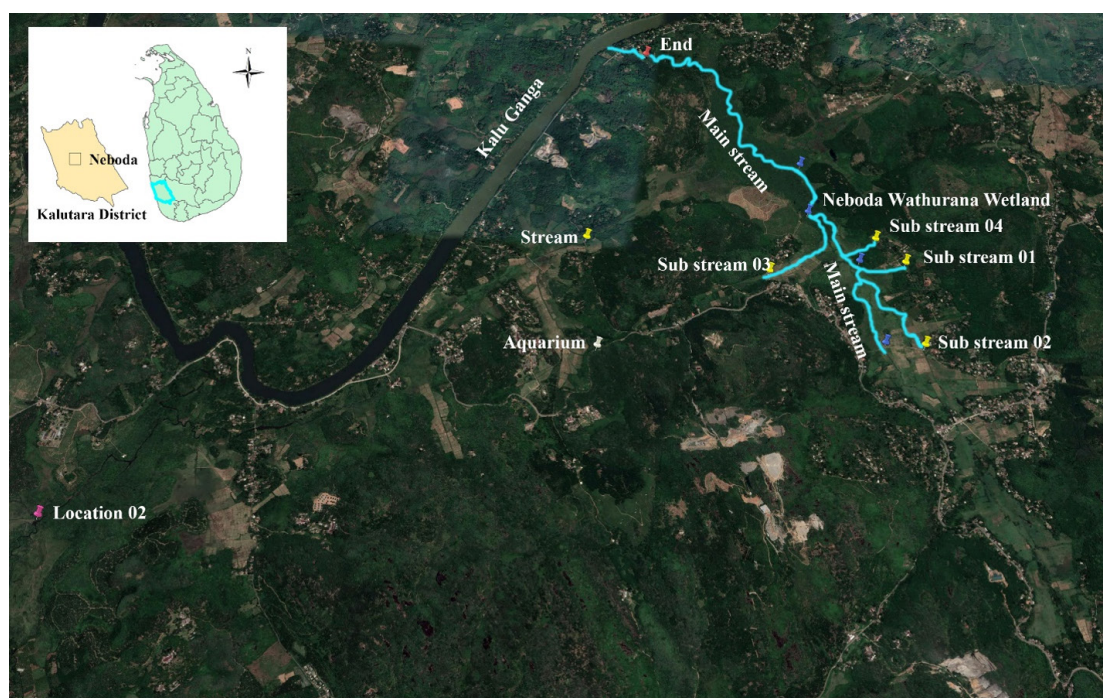


Figure 3: A map depicting the sampling site in the Naboda area in the Kalutara district. The mainstream, that runs through the Naboda Wathurana wetland is marked with blue pins while the sub-streams are marked with yellow pins. Owilana, the second location is marked as location 2.



Figure 4: Sampling sites in Neboda area. A. and B. Main stream infested with *C. furcata*; C. The infested mainstream runs through the Neboda Waturana wetland; D. A large pool, full of *C. furcata* growth, that occurs at the confluence area of substream 2 with the mainstream. Note the buffalos confined to the farther end of the pool; E. *Cabomba furcata* co-existing with *Salvinia molesta* in the mainstream and F. The area where the mainstream joins the 'Kalu Ganga'. Note the occurrence of the few remaining endemic and native plant species with *C. furcata* (CF); *Aponogeton rigidifolius* (AR), *Lagenandra ovata* (LO) and *Nymphaea nouchali* (NN). Note the types of the population, linear dispersion (B) and clump dispersion (D).



Figure 5: Infestations of *C. furcata* in Owilana area, the second location identified during the study. A. Populations along a stream concentrated towards the periphery; B. in a large pool and C. in a marshy area.

The association between the water flow and the type of the population was statistically significant ($p < 0.001$) indicating an association between the water flow and the type of the population, which is described in Figure 8. When the water flow of the stream is moderate to fast, the dispersion of the plant becomes mostly clump in nature. On the other hand, when the water flow is still or moderate, the dispersion of the plant becomes linear.

The association between the flow rate and the percentage cover value was statistically significant ($p < 0.001$). The highest plant cover (80-100%) is observed in still water, while the lowest cover (0-50%) is observed in moderate and moderate to fast water flow regimes (Figure 9).

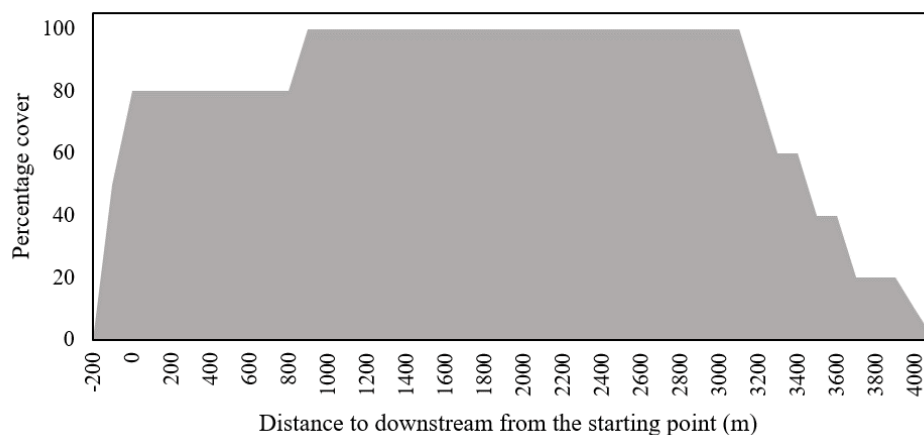


Figure 6: The percentage cover of *C. furcata* along the mainstream as visualized on the surface. The starting point of collecting data is denoted by the 0 (m).

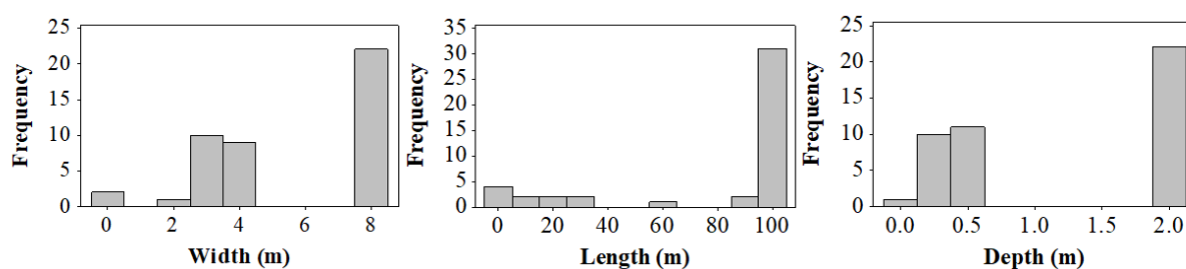


Figure 7: Histograms depicting the depth, length, and width of the extent of the spread of the plant population observed at 44 locations along the mainstream.

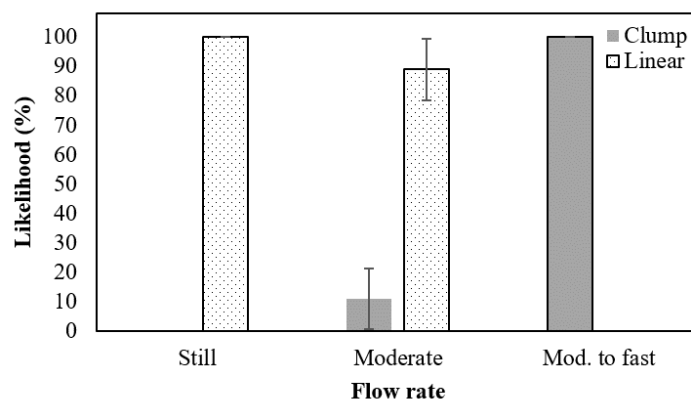


Figure 8: The association between the flow rate and type of the population of *C. furcata* in the mainstream.

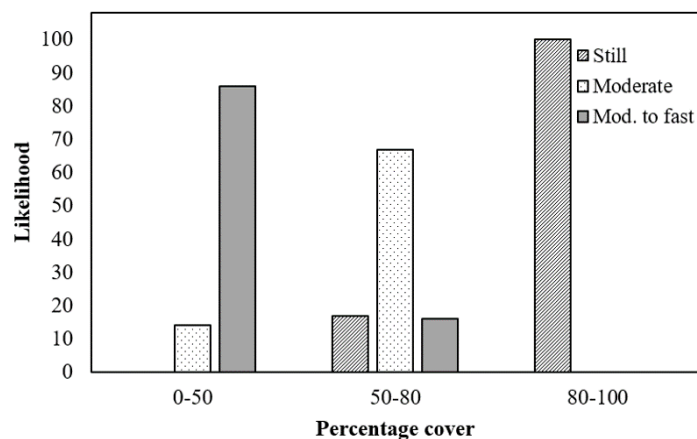


Figure 9: The association between the percentage cover of *C. furcata* population and the flow rate of the mainstream.

DISCUSSION

Aquatic plants have been playing a significant role as alien invasive plants in the world, and the incidents have become more common due to anthropogenic activities (Ding *et al.*, 2008; Thomaz *et al.*, 2015; Havel *et al.*, 2020). Sri Lanka has experienced many such invasions in the past where they have caused detrimental effects to the natural ecosystems. Aquatic invasive plants such as *Eichhornia crassipes*, and *Salvinia molesta* are now well-established and became a part of the natural ecosystem where their eradication is impossible. Similarly, another exotic water lily, *Nymphaea* × *erangae*, identified as a potential invasive, has invaded wetlands of the country. Hybridization between the native *N. nouchali* and *Nymphaea* × *erangae* has posed a threat to the 'genetic purity of the native (Yakandawala *et al.*, 2017). In this context, recording the early distribution and establishment of *C. furcata* in the local water bodies is imperative to take rapid measures to control them, which is vital in minimizing the impact of plant invasions (MMDE, 2015; Reaser *et al.*, 2020).

Cabomba furcata is commonly known as Red Cabomba or Forked Fanwort. The plant is well known as an aquarium plant in the ornamental aquatic plant industry. It is native to tropical and subtropical South America and the West Indies (Siti-Munirah and Chew, 2010). However, at present, the plant is recorded from outside its natural range in Asia; India (Anon, 2014; Shaji, 2020), and Peninsular Malaysia (Siti-Munirah and Chew, 2010; Sharip *et al.*, 2014), indicating its potential to expand the range. However, up to date, there are no records of its occurrence in natural ecosystems in Sri Lanka. The plant is recorded for its invasive behavior in literature in the newly established aquatic environments (Siti-Munirah and Chew, 2010; Anon, 2014). It is noteworthy to realize the fact that a closely related species, *C. caroliniana* is recorded as an invasive species in the Invasive Species Compendium (CABI 2021) and the Global Invasive Species Database (2021). *Cabomba furcata* is identified as a plant with a similar behavior in the latter database. *Cabomba furcata* is a submerged aquatic plant; hence they could go unnoticed until they spread, and the infestation is severe. As they grow underwater, the plant is easily mistaken for natives such as *Hydrilla* and *Ceratophyllum* due to their close resemblance, which is a common fact with many aquatic species (Les and Mehrhoff, 1999). Typically, aquatic plant invasions are unnoticed or overlooked until they are perceived as problematic. Once this stage has reached, it is virtually impossible to eradicate them, and the negative environmental impacts caused by their spread on natural communities are irreparable.

The findings indicate that *C. furcata* has escaped from its controlled environments, and thus extending its territory in watercourses of the Kalutara district. According to the information collected from the locals, the source of *C. furcata* plants seems to be an abandoned aquarium located closeby that raised both ornamental fish and aquatic plants (Figure 3, marked as the Aquarium). The exact time of the escape of the plant is unknown, but according to the locals the aquarium was closed for business and was unattended about five years back.

We presumed that the percentage cover, the type of the population (clump or linear dispersion), and the extent of the spread of the plant population in the water body (length, width, and depth of the spread) reflects the successful establishment and the growth of the alien *C. furcata*. The river flows downstream impact the fragmentation of aquatic plant species (Heidbüche *et al.*, 2016). Thus, the flow rate would have an impact on the establishment, growth, and spread of the alien plant species in the new environment. Considering the impact of flow rate on growth and the establishment of *C. furcata* populations, it occurs either as clumps or linear and is distributed in a systematic manner (Figure 5). Stream with a moderate to fast flow rate has resulted in mostly clump dispersion while the streams with still to moderate water flow have resulted in a linear dispersion. During the clump growth, further expanding of the population is restricted to withstand the water currents. In streams with a still to moderate flow rate, the linear dispersion accommodates more recruitment of individuals thus continuing the spread. The percentage cover of *C. furcata* expresses a maximum cover of 100% in the mainstream across a length of about 2.2 km, indicating that the plant has been well established. In addition to the mainstream, except sub-stream 02, all three other sub-streams expressed a 100% cover, for a shorter length, indicating a possibility of expanding the populations. According to the results, areas with still to moderate water flow are the most suitable condition for the establishment and growth of *C. furcata* (Figure 6). It is interesting to note that most of *C. furcata* in the second location in Owilana area was mostly confined to small pools in the marshy land and a slow-moving stream. Therefore, it is evident that the alien plant has found its suitable niche in streams and marshy lands with still to moderate water flow rates in the wet zone of the country. Further considering the distribution pattern, infestation being above 75% is not a random incident indicating that the plant has fully invaded the mainstream, thus confirming its potential to spread further.

'Kalu Ganga' is the second largest river basin in Sri Lanka, and lies entirely within the wet zone of the country. The average annual rainfall in the basin is 4,040 mm, and the catchment area is located in the highest rainfall area in the country. With heavy rains, the river basin is vulnerable to severe floods and flash floods (JICA, 2009). The spread of *C. furcata* may obstruct the usual flow rates of streams of the 'Kalu Ganga' basin due to overgrown populations. Hence, immediate control measures are vital to prevent the further spread of this plant in the 'Kalu Ganga' basin through floods. According to Anderson (2011), aquatic invasive macrophytes can be extremely difficult, if not impossible, to eradicate once established. *Cabomba* prefers a warm-temperate, humid climate, with an year around rainfall and a temperature range of 13-27 °C (Leslie, 1986). These conditions are prevailing in the wet zone of the country; hence there is a high chance of spreading rapidly in the wet zone of the country. According to villagers, the free movement and activities of buffalos in the area have been severely disturbed in canals infested with *C. furcata* due to its dense submerged growth.

Even though no records are available on the mode of spread of *C. furcata*, according to literature *C. caroliniana* spreads by seeds and by fragmentation (Schooler, 2006). Due to this reason, mechanical removal is not recommended as the fragmented particles could move along the watercourse, facilitating its further spreading. However, as the spread of *C. furcata* is in its initial stages and is restricted in distribution, mechanical removal could be employed with strict monitoring. Similar observations were recorded with *M. fluviatilis* Aubl. as even a fragment of 2 cm is capable of developing into a new plant (Yakandawala and Dissanayake, 2010). Apart from the application of herbicides, habitat modification through planting trees to increase shade (Abernethy, 1996) or decrease hydration (Bowmer *et al.*, 1995) are other possible methods that could be adopted to control this submerged invasive.

The watercourses in the lowland wet zone are rich in aquatic plants accommodating many species such as *Lagenandra*, *Cryptocoryne*, *Aponogeton*, *Utricularia*, *Nymphoids*, and *Blyxa*. If these exotic species invade other watercourses and marshy areas in the region, it would pose a threat to these native species and particularly endemics. According to the locals, these sub streams have been populated with *Aponogeton* species earlier, but with the spread of *C. furcata*, they are confined to smaller populations. We could detect *A. rigidifolius* H. Bruggen, *L. ovata* (L.) Thwaites, and *Nymphaea nouchali* Burm. f. in the mainstream co-existing with *C. furcata* close to the confluent area of the 'Kalu Ganga'. During the field survey, we noticed that the area is infested with many other invasive species such as *Salvinia molesta* D. Mitch., *Dillenia suffruticosa* (Griff.) Martelli, and *Annona glabra* L. It is interesting to note that *C. furcata* is currently coexisting with *S. molesta* in the main stream at Neboda Waturana wetland (Figure 4: E). This main site, Naboda Wathurana wetland, where the plant was recorded has been declared a National Protected Wetland Ecosystem in 2020.

As well recognized, preventing the entry and spread of Alien Invasive Species is cost effective and more successful than control and eradication efforts once the species is established (MMDE, 2015). Prevention requires committed collaboration between government institutes/authorities and other stakeholders including NGOs and locals. As we have identified and documented the spread of *C. furcata* in natural waterways in the wet zone of the island, it would be the responsibility of the authorities to initiate its control and eradication measures. Failing to act promptly would lead to the silent spread of *C. furcata*, resulting the history repeating with ensuing consequences similar to what we face today with other alien invasives such as *E. crassipes* and *S. molesta* which invaded our ecosystems over time. As a nation, we must be more vigilant about the aquatic species import to Sri Lanka for local use as well as for re-export. Whatever the monetary value associated, if they become invasive in the local environment, the damage the country has to face will be much higher than the profits.

CONCLUSIONS

The present study records *C. furcata* in watercourses in the Kalutara district and its potential as an alien invasive plant. This is the first record of *C. furcata* in the natural environment. Marshy areas and streams with still to moderate water flow rates were identified as the most suitable conditions for the establishment and growth of *C. furcata*. Considering the distribution pattern, it is on its path to extending its territory. With the early detection and limited spread, immediate action is recommended to remove the species from the existing watercourses as *C. furcata* is identified as a problematic plant in natural ecosystems elsewhere in the world.

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DECLARATION OF CONFLICT OF INTEREST

The authors declare no conflict of interest.

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