

Status of diversify of medicinal plants in floodplain basin of northern Bangladesh

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Received: 15-07-2014, Revised: 25-08-2014, Accepted: 09-09-2014

ABSTRACT

Status of macrophyte diversity of floodplain basin, under Netrokona and Sunamgonj haor basin of Bangladesh was conducted and a total number of 30 species of aquatic weeds were identified from the surveyed area. These macrophytes provide medicinal importance of direct human benefit and shelter to the periphyton and other aquatic insects, and act as a source of feed to the fish. Due to increasing pressure of agriculture, aquaculture and global affect, important 01 species were extinct, 04 species were endangered, 05 species were vulnerable status, 09 species were in lower risk and 11 species were not threatened position from biodiversity view point. Initiation of new technology for growth of aquatic weeds in the floodplain through community based co-management policy, would be helped to expand growth level in the survey area.

Keywords: Diversity, medicinal, species

The macrophysic with medicinal value, has a long history, being used traditionally in Ayurvedic, Unani, Diddha, Homeopathic, Allopathic and other alternate medicinal practices, such as folk-medicine, home-remedies, naturopathy, tantra-therapy and tribal medicine, since ancient times (Chopra et al., 1956). In Charak (100 B. C) and Sushruta (800 B.C) mention of 341 and 395 such plants, respectively has been made, evidently, the knowledge of plants with medicinal value has a long history dated back to ancient India. However, Plants used in alternate medicines require proper documentation with modern knowledge for their wider utilization. The aquatic plants, however, have not been evaluated adequately in this context, as bulk of the reported medicinal plants are from terrestrial origin, only, During the present study of floodplain liked, under Ganga and Brahamaputra river basins, as many as 30 species of macrophysic with medicinal value, have been recorded, which can be a potential source for deriving useful chemicals to support the alternate form of medicines. A rich diversity of aquatic plants and fish species is critical to the ecology and sustainable productivity of the Netrokona and Sunamgonj haor flood plains. These resources in Bangladesh are under severe threat due to environmental degradation which includes human interventions through construction of flood control embankments, drainage system and sluice gates, conversion of inundated land to crop land thereby reducing water area and indiscriminate use of pesticides, pollution from domestic, industrial and agrochemicals wastes and run off have resulted in extinction of a considerable amount of aquatic plant

and lives in same stretches of the open water system (Diaster, 1990).

MATERIALS AND METHODS

Aquatic weeds of different species in the present study were collected from various wetlands of Netrokona and Sunamgonj haor basin area of Bangladesh, manually. Quadrante samplers were also used to understand the relative frequency of various macrophysic inhabiting the wetlands. The plants thus collected were photographed and also made the herbaria to keep a record. The standard keys, such as Biswas and Calder (1936), Subramanian (1962), Prescott (1980), have been followed for proper identification of a macrophyte up to species level. The number of five codes (E, EN, VU, LR and NO) of IUCN, 2000 was followed to categorize the status of the aquatic weeds and to compare the trend among different years Shannon index was followed by Shannon (1948).

Shannon Diversity Index:

$$H = \sum_{i=1}^s (P_i * \ln P_i)$$

Where:

H = the Shannon diversity index

P_i = fraction of the entire population made up of species i

S = numbers of species encountered

Σ = sum from species 1 to species S

Note: The power to which the base e (e = 2.718281828.....) must be raised to obtain a number is called the natural logarithm (ln) of the number.

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Primary data were collected by direct interviews with individual respondents. Necessary explanations about questionnaire were given to the general people of the flood plain area who were interviewed wherever it was felt necessary. Secondary data were collected relevant literature and internet sites.

RESULTS AND DISCUSSION

In the present context, however, 30 species of such aquatic plants have been recorded from the floodplain wetlands of Netrokona and Sunamgonj haor basin.

The morphology and taxonomy of the recorded macrophytes are discussed.

Trapa natans (Family: Trapaceae)

It is a common floating aquatic herb with flexuose ascending stems and green photosynthetic submerged roots. Fruits are useful in vitiated conditions of liver, burning sensation, dyspepsia, hemorrhages, haemoptysis, diarrhea etc. which is very much similar study of Mukherjee *et al.*, (2007). This species was found throughout Bangladesh in ponds, lakes, beel, haor and also cultivated. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

Lemna minor Linn. (Family: Lemnaceae)

It is often used as a plant in both coldwater and tropical area as well as in outdoor ponds, though it must be frequently thinned by seining because of its rapid growth rate and may be considered a pest. It is also grown as a commercial crop for animal feed, primarily for fish as it is fast-growing and easy to harvest by surface skimming. It is a weedy floating, scale like seasonal or perennial herb. Whole plant is used in cutaneous disease and washing of ophthalmic tissues. It is reported to possess cooling, astringent, anti-scorbutic, diuretic properties and similar study of Gupta (2001). This plant was cosmopolitan, floating in still water. Presently, collected from the wetland of wetlands of Netrokona and Sunamgonj haor basin.

Nymphoides indica Linn. (Family: Gentianaceae)

It is a large plant with orbicular deeply cordate floating leaves up to 30cm in diameter. The plant is used as a substitute of chiretta (*Swertia chirayita* Karst.) and is used in fever and jaundice (Biswas and Calder, 1935). It was common occur throughout Bangladesh. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

Pistia stratiotes Linn. (Family: Araceae)

It is free-floating, stoloniferous, monocot weedy aquatic plant. It is used in inflammations of the skin in erysipelas and for the healing of abrasions. An external preparation are obtained by boiling the leaf-juice in coconut oil, is used to treat chronic skin diseases, leaves together with rose water and sugar are used in coughs and asthma, and poultice of leaves is recommended for hemorrhoids. The roots, have laxative and diuretic properties, ringworms can also be treated by rubbing the ashes of the plant into the scalp which is similar to Biswas and Calder (1935). It occurred throughout Bangladesh. Presently, collected from the wetlands of Netrokona and Sunamgonj haor basin.

Acorus calamus Linn. (Family: Araceae)

It is a semi aquatic, perennial, herb with the creeping rhizomes, highly branched, leaves slightly compressed, bright-green in colour. Rhizomes are medicinally active and are used in anti-inflammatory, sudorific, antiseptic, insecticidal, and etc purposes. It is useful in dyspepsia, calculi, epilepsy, tumours, dysentery, etc., which is agreed by Mukherjee *et al.* (2007). This species was found throughout Bangladesh, in marshy places, presently, collected from the wetlands of wetlands of Netrokona and Sunamgonj haor basin. It is also cultivated widely.

Alternanthera philoxerodes (Mart.) Griseb. (Family: Amaranthaceae)

It is a perennial dichotomous herb, anchored or floating, depending upon the depth of water. The proliferation of plants can be massive, attaining the status of weed, but extensively used as spinach in Bangladesh. It is useful in a number of stomach related ailments. The leaves, stems, and roots are used in various Siddha and Ayurvedic medicines. It is widely employed in modern herbal medicine as its sedative, laxative, diuretic, and carminative properties. It is used in Ayurveda to counter the side effects of all hallucinogens (Prescott, G. W. 1980). It was a common plant, prevalent in almost every where in the wetlands of Bangladesh.

Alternanthera sessilis (Family: Amaranthaceae)

It is a marginal, perennial, dichotomous herb, anchored or floating, commonly prevalent in wetlands. Whole plant is medicinally active and is used in leprosy, skin diseases, dyspepsia, hemorrhoids etc. The leaves are used as a vegetable in Southeast Asia. Occasionally it is cultivated for food or for use in herbal medicines which is agreed by Grubben *et al.*

(2004). This plant was found throughout Bangladesh in moist places. Presently collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Bacopa monnieri* (Linn.) Pennell. (Family: Scrophularaceae)**

It is a common marginal plant, growing in wet places. Whole plant is used in a number of ailments like pain, epilepsy, amentia, tumors, ulcers, acidity, dyspepsia etc. This is agreed by Sivaramakrishna *et al.* (2005) and Chatterji *et al.* (1965). It was found throughout Bangladesh. Presently, collected from wetlands of Netrokona and Sunamgonj haor basin.

***Centella asiatica* Linn. (Family: Apiaceae)**

Plants, creeping, slender, perennial and marginal whole plant is actively used against insomnia, cardiac debility, epilepsy, hoarseness, asthma, bronchitis, hiccup, amentia, abdominal disorders etc. Bangladeshi cuisine refers to the food and culinary traditions prevalent in Bangladesh. Bangladeshi culinary traditions and processes date far back in history. The culinary tradition of Bangladesh has close relations to surrounding Bengali and North-East Indian cuisine as well as having its own unique traits. Rice and fish are traditional favorites. With an emphasis on fish, vegetables and lentils served with rice as a staple diet. This is agreed by Sivaramakrishna *et al.* (2005).

This species was also found throughout Bangladesh on the moist places. Presently, it was collected from the wetland of Netrokona and Sunamgonj haor basin.

***Colocasia esculanta* Linn. (Family: Araceae)**

It is tuberous, perennial herb with underground corm of various sizes. The leaves are used in hemorrhages, otalgia, adenitis etc. while the corms are used in somatalgia, hemorrhoids, congestion etc. In Bangladesh taro is a very popular vegetable known as *mukhi* or *mukhi kochu*. It is usually cooked with small prawns or the ilish fish into a curry, but some dishes are cooked with dried fish. Its green leaves, *kochu pata*, and stem, *kochu*, are also eaten as a favorite dish and usually ground to a paste or finely chopped to make *shak* - but it must be boiled well beforehand. Taro stolons or stems, *kochur loti*, are also favored by Bangladeshis and cooked with shrimps, dried fish or the head of the ilish fish. Taro is available, either fresh or frozen, in the UK and US in most Asian stores and supermarkets specializing in Bangladeshi or South Asian food (Roy, 2006). It was a common and aggressive weed of humid areas. Presently, it was

collected from the wetland of Netrokona and Sunamgonj haor basin.

***Cyperus articulatus* Linn. (Family: Cyperaceae; Habitat: Marginal)**

It is tall glabrous sedge like with a stout, woody and stoloniferous rootstock with stems erect and robust growing up to 2m in height. The tuber is used as a tonic and stimulant and medicinal action. This plant uses as carminative, sedative, very useful in vomiting of pregnancy (Chopra *et al.*, 1969). It occurred throughout Bangladesh. Presently it was collected from the wetland of Netrokona and Sunamgonj haor basin.

***Ipomoea aquatica* Forsk. (Family: Convolvulaceae)**

It is a weedy perennial marginal to floating herb. The leaves are purgative and are used to purify blood. In Bangladesh it is known as *kolmishak* and stir-fried preparation of the leaves is a very popular dish. Also known as Eng Cai in the Hokkien dialect. It is usually fried with fermented krill “belacan eng cai”, boiled with preserved cuttlefish then rinsed and mix with spicy rojak paste “jiu hu eng cai”, boiled eng cai also used to serve with fermented krill noodle “belacan bee hoon” and prawn noodle (Mukherjee *et al.*, 2007 and Prescott, 1980). It was common throughout Bangladesh. Presently, it was collected from the wetlands of netrokona and sunamgonj haor basin.

***Jussiaea repens* Linn. (Family: Onagraceae)**

It is perennial, succulent, dicotomous, creeping or floating, weedy herbaceous marginal plant, The herb is used as paste or poultices for ulcers and skin complaints (Chopra, 1956). This species was found throughout Bangladesh in freshwater tanks. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Linnophyla indica* Linn. (Family: Scrophulariaceae)**

Plant slender or much branched, growing up to the height of 30cm. Whole plant is regarded to be antiseptic, used to treat elephantiasis, pestilent fever, dysentery etc (Gualtiero Simonetti, 1990). It was widely distributed species in Bangladesh. Presently, collected from the wetlands of wetlands of Netrokona and Sunamgonj haor basin

***Marsilea quadrifolia* Linn. (Family: Marsilaceae)**

It is weedy, creeping herbaceous perennial marginal herb with slender long dichotomously branching rhizome s rooting at the nodes. Whole plant

is used in psychopath, ophthalmic, stranger, diarrhea, cough, bronchitis, leprosy, skin disease, hemorrhoids, dyspepsia, fever and insomnia. This is agreed by Sivaramakrishna *et al.* (2005) and Chatterji *et al.* (1965). It was found throughout Bangladesh, in marshy places, Presently, collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Monochoria vaginalis* (Family: Pontederaceae).**

It is a common marginal plant, erect of obliquely erect, herbs with variable shape of leaves. The roots and leaves are medicinally important. The roots are used in tooth-ache while the bark with sugar is used in case of asthma (Subramanyam, 1962). It was common throughout Bangladesh in tanks, shallow pools, flooded paddy fields and swampy or inundated localities. Presently, collected from the wetland Netrokona and Sunamgonj haor basin.

***Polygonum glabrum* Willd. (Family: Polygonaceae).**

It is an erect, glabrous, annual herb rooted through the lower nodes and reaching up to a height of 1.5m. Whole plant is medicinally important and is used as a febrifuge and the infusion of leaves in colic pain (Roy, 2006). It was occurred throughout Bangladesh in small ponds, lakes and ditches. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Polygonum barbatum* Linn. (Family: Polyonaceae)**

It is an erect annual plant with long and conspicuous fimbriated ciliae on the ocreae. The roots and seeds are medicinally important. Roots are used as astringent and cooling agent while the seeds are used for relieve of gripping colic pains (Roy, 2006). It occurred throughout the Bangladesh. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Scripus gorossus* Linn. (Family: Cyperaceae)**

It is a large, perennial, glabrous herb with a stout root stock, sometimes stoloniferous. The tubers are used in diarrhea and vomiting (Roy, 2006). It occurs in still or running waters throughout Bangladesh. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Typha angustata* Bory and Chaub. (Family: Typhaceae)**

It is a robust plant growing up to 4m high. The rootstock is used as an astringent and diuretic. The

seeds have a high linoleic acid content and can be used to feed cattle and chickens which is agreed by Reed *et al.* 1955. It is a common plant throughout Bangladesh in ponds, lakes, slow running rivers and stream and marshy region. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Euryale ferox* Salib, (Family: Nymphaeaceae)**

A common rooted perennial aquatic herb, very deeply rooted by means of thick fleshy fibrous roots. The seeds are used as tonic and deobstruent. Its edible seeds are used in traditional Chinese medicine, where they are often cooked in soups along with other ingredients (Warrier *et al.*, 1955). It was widely distributed in freshwater tanks of Bangladesh. Presently it was collected from the wetland of Netrokona and Sunamgonj haor basin.

***Hygrouyza aristata* (Family: Poaceae)**

It is a common floating glabrous, aquatic grass with culms 30-45cm long, diffusely branched, rooting in dense masses at the nodes. Roots and seeds are useful in stranger, diarrhea, and osteopathy, burning sensation, hyperpiesia, fatigue, lever ailments and general debility (Mukherjee *et al.*, 2007). It was found throughout Bangladesh in wet places. Presently, it was collected from the wetlands of netrokona and sunamgonj haor basin.

***Nelumbo nucifera* (Family: Nymphaeaceae)**

It is a rooted emergent plant with broad round leaves; stem slender and elongated; rhizomes creeping with roots at the nodes. Whole plant is of medicinal value. The stem is useful in vomiting, leprosy, skin disease, helmenthiasis etc. The roots are used in pharyngopathy, pectrolgia, spermatorrhoea, smallpox etc. The leaves are used in strangury, hemorrhoids etc. The flowers are used in hyperdypsia, cough, bronchitis etc. The stamens are useful in diarrhea, hyperdypsia, inflammation etc. The fruits and seeds are used in halitosis, burning sensation, vomiting etc. Lotus rootlets are often pickled with rice vinegar, sugar, chili and garlic. It has a crunchy texture with sweet-tangy flavours. In Asian cuisine, it is popular with salad, prawns, sesame oil and for coriander leaves. Lotus roots have been found to be rich in dietary fiber, vitamin C, potassium, thiamin, riboflavin, vitamin B₆, phosphorus, copper, and manganese, while very low in saturated fat (Shen-Miller *et al.*, 1995). This plant was available



Fig.1: *Trapa natans*



Fig. 2: *Lemna minor*



Fig. 3: *Nymphoides indica*

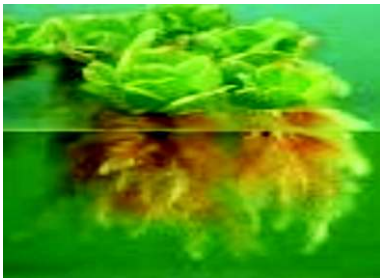


Fig. 4: *Pistia stratiotes*



Fig. 5: *Acorus calamus* Linn



Fig.6: *Alternanthera philoxerodes*



Fig. 7: *Alternanthera sessilis*



Fig. 8: *Bacopa monnieri*



Fig. 9: *Centella asiatica*



Fig. 10: *Colocasia esculenta*



Fig. 11: *Cyperus articulatus*



Fig. 12: *Ipomoea aquatica*

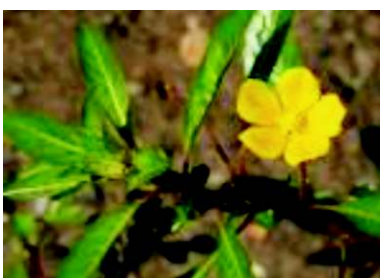


Fig. 13: *jussiaea repens*



Fig.14: *Limnophyla indica*



Fig. 15: *Marsilea quadrifolia*



Fig. 16: *Monochoria vagnalis*



Fig. 17: *Polygonum glabrum*



Fig.18: *Polygonum barbatum*



Fig. 19: *Scripus gorossus*



Fig. 20: *Typha angustata*



Fig. 21: *Euryale ferox*



Fig. 22: *Hygrouyza aristata*



Fig. 23: *Nelumbo nucifera*



Fig. 24: *Nymphaea nouchali*



Fig. 25: *Nymphaea stellata*



Fig. 26: *Ceratophyllum demersum*

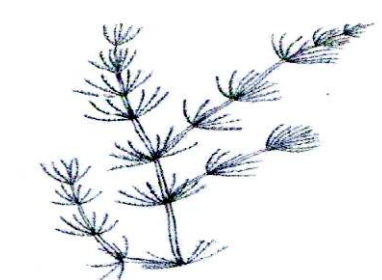


Fig. 27: *Chara spp*



Fig. 28: *Nitell spp.*



Fig. 29: *Ottelia alismoides*



Fig. 30: *Vallisneria spiralis*

throughout Bangladesh, in marshy lands. Presently, it was reported from the wetlands of Netrokona and Sunamgonj haor basin.

***Nymphaea nouchali* (Family: Nymphaeaceae)**

It is an emergent perennial herb with short, erect, roundish and tuberous, rhizomes. Rhizome, flower and seeds are medicinally important. The rhizome is useful in diarrhoea, dysentery, dipsia and general debility. The flowers are astringent and cardio-tonic. The seeds are sweet, cooling, constipating, aphrodisiac, stomachic, and retroactive. They are useful in vitiated condition of liver, dipsia, diarrhoea and dermatopathy (Farooqui, 1980). It was widely distributed in Bangladesh in shallow tanks, ponds and ditches. Presently, collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Nymphaea stellata* Wild. (Family: Nymphaeaceae)**

It was rooted free floating perennial herb; leaves orbicular; flowers small white, pale blue or multi coloured. The plant is used as cardio-tonic (Dhanabal, 2007). It is common throughout the warmer parts of Bangladesh. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Ceratophyllum demersum* Linn. (Family: Ceratophyllaceae)**

It is a common fragile submerged hygrophyte, 20-90cm long. Whole plant is useful in diarrhoea, dysentery, burning sensation, hyperpiesia, epitaxis,

heamatemesis, haemophysis, hemorrhoids, ulcers etc (Hiscock, 2003) It was found throughout Bangladesh including Andaman Islands, in stagnant waters. Presently, collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Chara* spp. Linn. (Family: Characeae)**

It is a macroscopic submerged alga with nodes and internodes bearing thallus, anchored with the help of its multi-cellular rhizoids. In appearance it resembles a vascular plant. It has the insecticidal properties (Round, 1966). It occurs throughout Bangladesh, both in soft and hard water, Presently, it was collected from the wetlands of wetland of Netrokona and Sunamgonj haor basin.

***Nitella* spp. Linn. (Family: Characeae)**

It is a mucilaginous alga like *Chara*, the difference, however, lies in the position of sex organs. In case of *Chara* the oogonium is above the andtheridium while in *Nitella* it is below the antheridium. Besides, it does not emit musk odour as in case of *Chara*. It is used as mosquito repellent (Farooqui, 1980). It occurs commonly every where in shallow to deep waters. Presently, it was collected from the wetlands of wetlands of netrokona and sunamgonj haor basin.

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Table 1: Conservation status and distribution of aquatic weeds according to Indigenous technical knowledge of general people.

SL.No.	Habitat	Local name	Scientific name	Family	Status		
					2011	2012	2013
1.	Floating	Water chestnut	<i>Trapa natans</i>	Trapaceae	NO	NO	NO
2.	Free floating	Duck weed	<i>Lemna minor</i>	Lenmaceae	VU	VU	LR
3.		Water snowflake	<i>Nymphoides indicum</i>	Gentianaceae	VU	VU	LR
4.		Water lettuce	<i>Piatia stratiotes</i>	Areceae	NO	NO	NO
5.	Marginal	Sweet Flag or Calamus	<i>Acorus calamus</i>	Araceae	VU	VU	LR
6.		Alligator-weed	<i>Alternanthera philoxerodes</i>	Amaranthaceae	NO	VU	VU
7.		Sessile joy weed	<i>Alternanthera sessilis</i>	Amaranthaceae	NO	NO	NO
8.		Brahmi	<i>Bacopa monnieri</i>	Scrophularaceae	NO	NO	VU
9.		Centella	<i>Centella asiatica</i>	Apiaceae	NO	NO	NO
10.		Fox nut	<i>Colocasia esculanta</i>	Araceae	VU	VU	LR
11.		Pripiary	<i>Cyperus articulatus</i>	Cyperaceae	NO	NO	NO
12.		Kalmilata	<i>Ipomoea aquatica</i>	Convolvulaceae	LR	EN	EN
13.		Floating primrose willow	<i>jussiaea repens</i>	Onagraceae	LR	LR	VU
14.		Ambulia	<i>Limnophyla indica</i>	Scrophulariaceae	LR	EN	EN
15.		Water shamrock	<i>Marsilea quadrifolia</i>	Marsilaceae	LR	LR	LR
16.		Heartleaf false	<i>Monochoria vagnalis</i>	Pontaderaceae	LR	LR	VU
17.		Common marsh buckwheat	<i>Polygonum glabrum</i>	Polygonaceae	NO	LR	LR
18.		Knotgrass	<i>Polygonum barbatum</i>	polyonaceae	NO	NO	NO

mosquito repellent (Farooqui, 1980). It occurs commonly every where in shallow to deep waters. Presently, it was collected from the wetlands of netrokona and sunamgonj haor basin.

***Ottelia alismoides* Linn. (Family: Hydrocharitaceae)**

It is a common, flaccid, submerged, annual herb. Whole plant is used in the complaints of women and also in for fracture of bones (Meiyi and Yasuro 2001). Occur throughout Bangladesh. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin.

***Vallisneria spiralis* Linn. (Family: Hydrocharitaceae)**

It is a perennial, dioeciously, monocot, leafy, submerged plant. Whole plant is used as stomachic and leucorrhoea (female ailment) (Round, 1966). It was common throughout Bangladesh. Presently, it was collected from the wetlands of Netrokona and Sunamgonj haor basin. In the survey area, an important 01 species were extinct, 04 species were endangered, 05 species were vulnerable status, 09 species were in lower risk and 11 species were not threatened position.

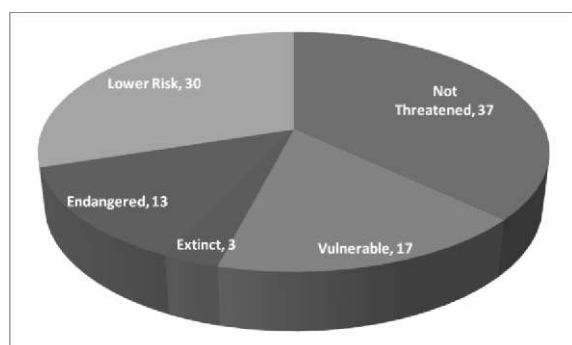


Fig. 31: Status of aquatic weeds in Netrokona and Sunamgonj haor basin

From the Fig. 31 and Table 1, the status of the 30 aquatic medicinal plants of the Netrokona and Sunamgonj haor basin was found as different status. Important one (3.0 %) species such as *Nitell spp.* was rarely found in the year 2012 but this species was extinct (E) between 2012 and 2013. About four (13.0%) importance species was facing as very high risk of extinction (Endangered, EN), five (17.0%) species was facing as risk of extinction (Vulnerable status, VU), nine (30.0%) species were identified as Lower Risk (LR) and eleven (37.0%) species was Not threatened (NO) position, respectively (Ghosh, 2004 and Gupta *et al.* 2006).

It is a universal fact that the loss of one set of biota may be the gain for another set of biota, especially in changing ecosystem scenario. In the backdrop of such a scenario and with the emerging market for herbal medicines, the floodplains may turn into an ideal habitat for harnessing a number of useful medicinal plants. However, it needs to be understood in its right perspective and without encroaching upon the benefits of other production sectors. Evidently, integration of various farming activities together with the traditional knowledge, especially the fisheries and horticulture in the present context, could be a viable alternative from economic point of view. The marginal and exposed trimming areas of floodplain, which are generally referred to as wasteland, can suitably be used for the cultivation of medicinal plants, leaving aside the deeper aquatic zone for fishery activities. Many existing macrophytes, which have assumed the status of weeds even in deeper parts of a system, affecting the fisheries adversely, can also be gainfully utilized for getting useful chemical derivatives of medicinal importance for direct human benefit. The necessity, however, would be to draw an acceptable and viable strategy for harnessing the wetlands in their totality without any bias towards a single commodity, and also in the context of existing and emerging ecological scenario around these ecosystems. A management committee is needed to develop a working frame work on sharing of benefits, developing rules and regulations for wetland resource management including aquatic weeds. Participation of local member of the community and their active involvement played an important role in overall management of wetland resources like beel nurseries system of Bangladesh (Chakraborty *et al.*, 2010).

ACKNOWLEDGEMENTS

The authors are gratefully acknowledged the Department of Fisheries, Bangladesh for kind support and cooperation.

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