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Study on Diversity, Taxonomy and Impact of Macrophytes on the Fresh Water Resources (Minor Project-Dam) of Yavatmal District, Maharashtra, INDIA

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Abstract

The Macrophytes diversity in twenty two fresh water resources (Minor Project-dam) was studied during the year 2009-2010. Total twenty species of Macrophytes belonging to sixteen families were found in the Twenty two minor project, out of which Seven in Umerda, Nine in Kapra, Five in Zola, Eleven in Takli, Nine in Ghoti, Four in Majra, Eight in Antergaon, Ten in Pimpalkhuti, Ten in Eklara, seven in Shivni, Eight in Chorkhund, Eleven in Khandani, Five in Karanji, Seven in Singandov, Eight in Ner, Twelve in Kumbharkinhi, Seven in Hatola, Five in Etola, Nine in Devgaon, Seven in Mudana, Eight in Nignur and Six in Piranji. The following impacts were noticed. All the dams are seriously affected by unwanted growth of aquatic weeds. Many of these weeds are survive well in the new environments and grow at a fast rate. They compete with native vegetation which can lead to ecological shifts and also affect the quality of water. They increase water loss through absorbs and transpire more water by evapotranspiration. They were reducing the storage, conveyance capacity of dams and Impede recreational activities like swimming, fishing and boating. They may also cause physico-chemical changes like reduction in oxygen levels and present gaseous exchange with water resulting in adverse fish production. They can provide a favorable and protected habitat for disease vectors mainly the insects. The rapid spread of aquatic weeds in the dam's vegetative and other means is creating serious socio-economic problems. Depending on the species and abundance of these weeds it is often necessary to control them. Aside from the aesthetic value of a well kept pond, an over abundance of weeds can create a hazard for aquatic life, offensive odors, breeding grounds for mosquitoes, and a hindrance to water sports. So the management of weeds is important. Immediate action should be taken by the authority for to improving the availability of dam water which is mainly used for pisiculture and irrigation purposes by Taluka (where the dam is constructed) of Yavatmal District.

Keywords: Aquatic macrophytes, diversity, taxonomy, impact, fresh water resources.

Introduction

Aquatic weed growths in any source of water create problems involved with practically all water uses. A knowledge of the identify of over one hundred species of aquatic plants which seriously affect water resources is necessary if effective mechanism are to be applied[1]. Aquatic weeds are those plants growing in or near water and complete at least a part of their life cycle in water resources. Aquatic weeds referred to as Macrophytes constitute an important component of an aquatic ecosystem. The Macrophytes are classified broadly into six groups based upon their size, shape and growth habits. Following groups are planktonic algae, filamentous algae, submersed weeds, emerged weeds, marginal weeds and floating weeds[2]. Aquatic weeds hinder navigation, chocking rivers, irrigation channels, dams etc., impede drainage and interfere swimming recreation on water bodies. Their diversity and biomass influence primary productivity and complexities of tropic states[3]. The fresh water resources are dynamic in nature of physico-chemical status due to environmental and anthropogenic pressure. An ecologically well balanced ecosystem supports fairly wide variety of Macrophytes but excessive growth of Macrophytes caused serious problems for water quality and pisiculture[4].

Material and Methods

The fresh water bodies selected for the present investigation are situated on different locations which are shown in map figure-1. Their name, Taluka, types of project, location, area and utility value are mention in table-1. All dams are surrounded by open hills and the main source of water which drains during monsoon and also Small River, streams, nala and many seasonal sources. Macrophytes in shallow water can be collected by hand while those from deeper waters with the help of long handed hook net. Collected specimens are thoroughly washed and excess water soaked with a filter paper, kept in polythene bag and brought to the laboratory. The Macrophytes were identify and classified with the help of literature.

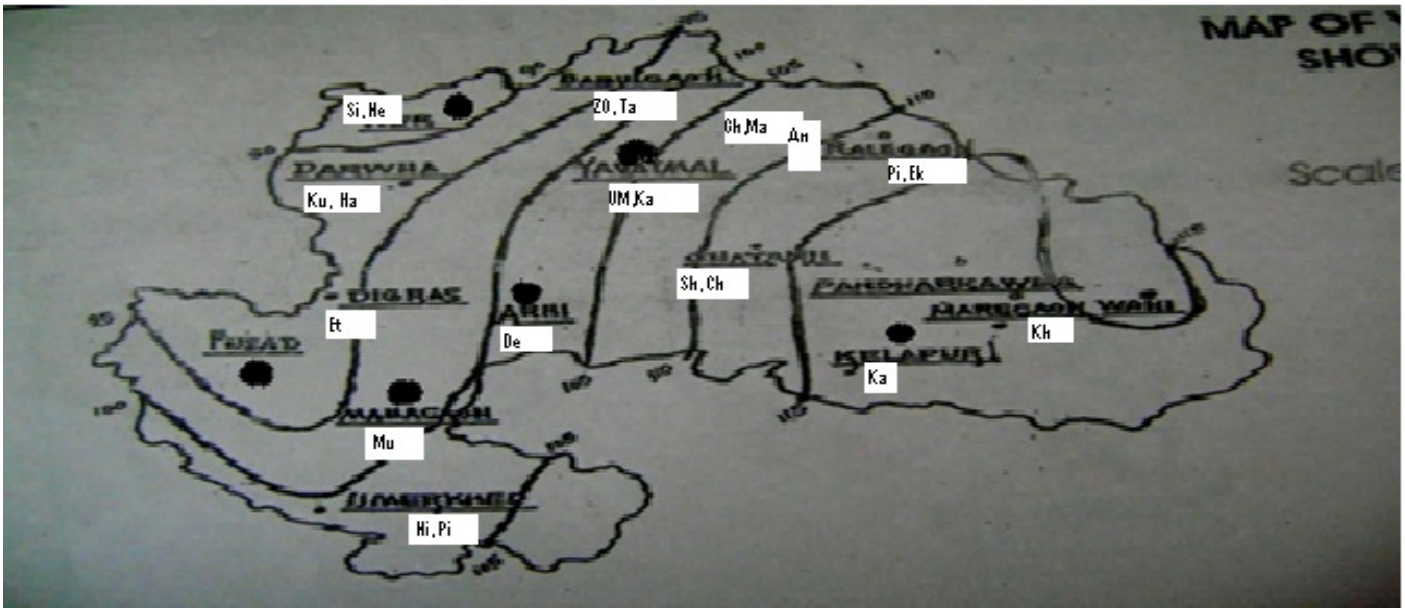

Figure-1
Yavatmal District Map- Located Dam in the Taluka.

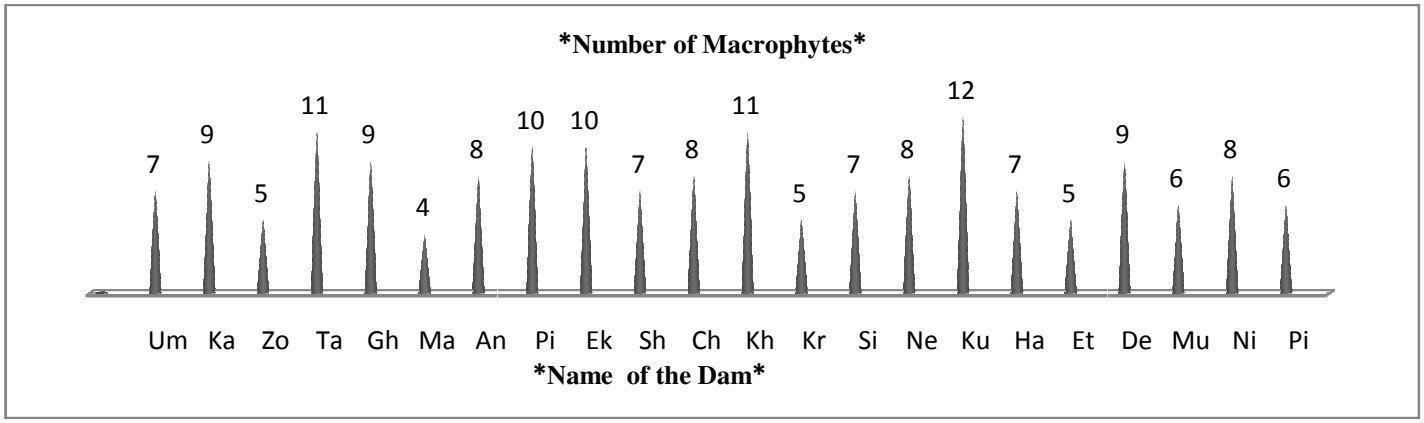

Figure-2
Distribution of Macrophytes in Dams

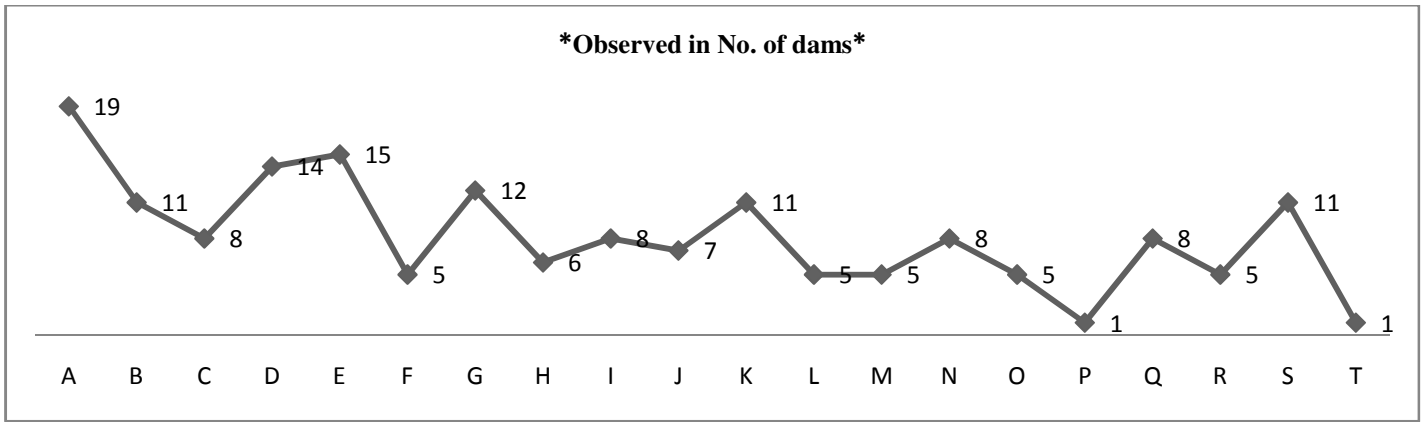

Figure-3
Type of Macrophytes are found in No. of Dams

Table-1
Detail features of the dam

Name of the Dam	Taluka	Type of Project	Location	Area (sq.k.m.)	Utility value
Umerda	Yavatmal	Minor	20^0-1'-1/2'', 77^0-1'-1/4"	11.82	Irrigation/Pisiculture
Kapra	Yavatmal	Minor	20^0-28'-00'', 78^0-4'-00"	27.35	Irrigation/Pisiculture
Zola	Babhulgaon	Minor	20^0-27'-40'' ,78^0-16'-00"	9.14	Irrigation/Pisiculture
Takli	Babhulgaon	Minor	20^0-24'-30'' ,78^0-14'-30"	32.48	Irrigation/Pisiculture
Ghoti	Kalamb	Minor	20^0-25'-30'' ,78^0-17'-30"	13.73	Irrigation/Pisiculture
Manjra	Kalamb	Minor	20^0-23'-20'' ,78^0-27'-40"	5.11	Irrigation/Pisiculture
Antergaon	Kalamb	Minor	20^0-17'-30'' ,78^0-25'-00"	29.78	Irrigation/Pisiculture
Pimpalkhuti	Ralegaon	Minor	20^0-21'-20'' ,78^0-30'-40"	15.15	Irrigation/Pisiculture
Eklara	Ralegaon	Minor	20^0-24'-15'' ,78^0-26'-00"	9.84	Irrigation/Pisiculture
Shivni	Ghatanji	Minor	20^0-9'-30'' ,78^0-25'-50"	6.99	Irrigation/Pisiculture
Chorkhund	Ghatanji	Minor	19^0-50'-00'', 78^0-2'-30"	8.24	Irrigation/Pisiculture
Khadni	Maregaon	Minor	20^0-3'-41'' ,78^0-42'-04"	15.67	Irrigation/Pisiculture
Karanji	Kelapur	Minor	20^0-8'-00'' ,78^0-37'-00"	3.17	Irrigation/Pisiculture
Singandov	Ner	Minor	20^0-24'-06'' ,77^0-58'-8"	41.19	Irrigation/Pisiculture
Ner	Ner	Minor	20^0-28'-53'' ,77^0-51'-55"	7.59	Irrigation/Pisiculture
Kumbharkinhi	Darvha	Minor	20^0-18'-00'' ,77^0-39'-00"	11.91	Irrigation/Pisiculture
Hatola	Darvha	Minor	20^0-27'-00'' ,77^0-38'-08"	10.45	Irrigation/Pisiculture
Etola	Digras	Minor	20^0-11'-26'' ,77^0-28'-00"	1.78	Irrigation/Pisiculture
Devgaon	Aarni	Minor	20^0-9'-40'' ,77^0-55'-15"	48.17	Irrigation/Pisiculture
Mudana	Mahagaon	Minor	19^0-44'-00'', 77^0-45'-00"	5.13	Irrigation/Pisiculture
Nignur	Umerkhed	Minor	19^0-38'-00'' ,77^0-31'-00"	24.32	Irrigation/Pisiculture
Piranji	Umerkhed	Minor	19^0-37'-30'' ,77^0-48'-00"	8.63	Irrigation/Pisiculture

Table-2
Total Macrophytes were occurred in twenty two water bodies.

Fa mily	Scientific Name	Types of Macrophytes	Common Name
A. Hydrocharitaceae	A. Hydrillla verticillata	A. Rooted submersed	A. Hydrillla
B. Potamogetonaceae	B. Potamogeton diversifolius	B. Rooted floating leaf	B. Pond weed
C. Potamogetonaceae	C. Potamogeton Crispus L.	C. Rooted floating leaf	C. Curly-leaf P.weed
D. Convolvulaceae	D. Ipomoea aquatica	D. Rooted hydrophytes	D. Kalmi
E. Hydrocharitaceae	E. Vallisneria spiralis	E. Submerged species	E. Eel weed
F. Polygonaceae	F. Polygonum amphibium L.	F. Rooted emergent	F. W. smart weed
G. Najadaceae	G. Najas minor	G. Rooted submerged	G. Naiad
H. Cyperaceae	H. Eleocharis plantoginea	H. Rooted emergent	H. Spike ruch
I. Cladophoraceae	I. Cladophora spp.	I. Filamentous alga	I. Cotton mat t. alga
J. Typhaceae	J. Typha spp.	J. Marginal s species	J. Common cattail
K. Characeae	K. Chara zeylennica	K.Submerged species	K. Musk grass
L. Lemnaceae	L. Lemna minor	L. Floating hydrophytes	L. Duck weed
M. Cyperaceae	M. Scirpus articulatus	M. Rooted emergent	M. Bulrush
N. Nostocaceae	N. Anabaena spp.	N. Submerged species	N. Blue green alga
O. Hydrocharitaceae	O. Elodea Canadensis	O. Submerged species	O. Flodea
P. Nymphaeaceae	P. Nelumbo nucifer	P. Rooted floating leaf	P. Lotus
Q. Paniceae	Q. Panicum purpurascens	Q. Amphibious m.species	Q. Para grass
R. Graminaea	R. Pharagmites communis	R. Amphibious m.species	R. Common reed
S. Chlorophyceae	S. Spirogyra spp.	S. Slimy green algae	S. Slimy green alga
T. Salviniaceae	T. Azolla imbricate	T. Floating hydrophytes	T. Water fern

Table-3
Types of Macrophytes and No. times are found in the dams.

Name of the Dam	Macrophytes are found	Type of Macrophytes	Observed in No. dams
Umerda(Um)	A,D,E,G,I,K,S	A	19
Kapra(Ka)	A,B,D,E,I,J,K,N,S	B	11
Zola(Zo)	A,E,L,Q,S	C	8
Takli(Ta)	A,B,D,V,G,H,J,K,M,R,S	D	14
Ghoti(Gh)	A,B,C,D,E,F,N,K,N	E	15
Manjra(Ma)	A,K,R,S	F	5
Antergaon(An)	A,B,D,E,G,I,Q,S	G	12
Pimpalkhuti(Pi)	A,B,C,D,E,G,H,J,K,L	H	6
Eklara(Ek)	A,C,D,E,G,H,J,P,Q,T	I	8
Shivni(Sh)	A,B,F,I,J,N,S	J	7
Chorkhund(Ch)	A,C,D,E,G,I,N,S	K	11
Khadni(Kh)	A,B,C,D,E,L,N,O,Q,R,S	L	5
Karanji(Ka)	D,I,N,Q,S	M	5
Singandov(Si)	A,B,E,G,H,K,L	N	8
Ner(Ne)	A,C,D,E,M,O,Q,R	O	5
Kumbharkinhi(Ku)	A,B,C,D,E,F,G,H,I,J,K.M	P	1
Hatola(Ha)	C,D,G,I,J,K,N	Q	8
Etola(Et)	G,H,I,N,Q	R	5
Devgaon(De)	A,B,D,E,F,G,K,L,M	S	11
Mudana(Mu)	A,G,M,O,Q,R	T	1
Nignur(Ni)	A,B,E,F,K,N,Q,S		
Piranji(Pi)	A,E,G,O,Q,R		

Resutls and Discussion

Total twenty species of Macrophytes belonging to sixteen families were found in the twenty two minor project, out of which Seven in Umerda, nine in Kapra, five in Zola, eleven in Takli, nine in Ghoti, four in Majra, eight in Antergaon, ten in Pimpalkhuti, ten in Eklara, seven in Shivni, eight in Chorkhund, eleven in Khandani, five in Karanji, seven in Singandov, eight in Ner, twelve in Kumbharkinhi, seven in Hatola, five in Etola, nine in Devgaon, seven in Mudana, eight in Nignur and six in Piranji. They are categorized alphabetically and their numbers are also mention in the table-3 and figure-2. Their detail is given in table-2. According to observations Hydrillla verticillata, Ipomoea aquatica and Vallisneria spiralis were dominated almost in all the minor projects[5]. Najas minor, Chara zeylennica, Spirogyra spp., Potamogeton diversifolius were majorly found in most of the dams. Potamogeton Crispus L., Polygonum amphibium L., Eleocharis plantoginea, Cladophora spp., Typha spp., Lemna minor, Scirpus articulates, Anabaena spp., Elodea Canadensis, Panicum purpurascens and Pharagmites communis were commonly found in the dams. Nelumbo nucifer and Azolla imbricate were very rarely observed in one or two of the dams.

The individual impact of aquatic weed on water body are following- A. Hydrillla verticillata- Alone dominated the other plants. They restrict the movement of organisms mainly the fishes and provide shelter to small size predatory fishes and insects. B. Potamogeton diversifolius- serve competition exits with planktonic algae for nutrients and results in decreased production and disturbs water quality[6]. C. Potamogeton Crispus L.- They were capable of absorbing nutrients through leaves, stems and roots. D. Ipomoea aquatica- They choke up the water body and responsible to reducing dam productivity. They make loss of water through eva-transpiration in addition to impediment caused in flow of water and also responsible for pollution. E. Vallisneria spiralis- This weed damage maximum, because it cannot visible on the surface and impedes the flow of water varying upon the degree of their intensity and growth. F. Polygonum amphibium L.- It had been observed in and around water-bodies. The ecological environment of this region is highly congenial for growth, reproduction and dissemination of this weed. G. Najas minor - They compete for space with the fishes and also disturb dissolved O2-CO2 of pond water[7]. H. Eleocharis plantoginea- It forms a dense mat from the small stems in that profile of a dam where the photosynthetic biomass is concentrated just above the basal area. I. Cladophora spp.- The filamentous alga produces undesirable odors and also spoils the taste of drinking water. J. Typha spp.- Plants are found along the shoreline of water body. They provide shelter to small size predatory fishes and insects. K. Chara zeylennica - When crushed emit a musky odor similar to garlic and give noxious smell. Densely grow and impede water flow and interfere with fishing. L. Lemna minor - This weed makes loss of water through evatranspiration. M. Scirpus articulates - The large colonies are impeding the flow of water in shallow. Due to this weed vast areas remains inundated with for a long periods and may only drought in dams. N. Anabaena spp.- Excessive phyto planktonic booms may result to zooplankton developments which may deplete water and lead to eutrofication which may prove destructive to fish and other aquatic life[8]. O. Elodea Canadensis - It grows up to 1m. According to depth of water flowering and fruiting below the water, seeds raise and heavy buds drop to the bottom and grow in the dam and acquires large area. P. Nelumbo nucifer- Lotus is a large herbaceous

aquatic plant common in muddy shallow water dams. Q. Panicum purpurascens - Dense stand can develops into floating mat which can create problems in drainage ditches to impede water flow. R. Pharagmites communis - Culms are alga brows or smooth which sprawl on water and form dense floating mats. It interfere with boat traffic and fishing on small streams. S. Spirogyra spp. - Dense growth of all these filamentous algae prevents fishing deplete oxygen, favors small insects breeding site and gives an undesirable appearance. T. Azolla imbricate - It is commonly found on shallow water covers densely the water surface of the dam and interferes with fishing[9]. Many of these weeds survive well in the new environments and grow at a fast rate i.e. they compete with native vegetation which can lead to ecological shifts and also affect the quality of water[10-11]. They increase water loss through absorbs and transpire more water by evapotranspiration. They were reducing the storage, conveyance capacity of dams and Impede recreational activities like swimming, fishing and boating. They may also cause physico-chemical changes like reduction in oxygen levels and present gaseous exchange with water resulting in adverse fish production [12-13]. They can provide a favorable and protected habitat for disease vectors mainly the insects. The impacts were noticed that dams are seriously affected by unwanted growth of aquatic weeds [14-15]. The rapid spread of aquatic weeds in the dam's vegetative and other means is creating serious socio-economic problems[16]. Depending on the species and abundance of these weeds it is often necessary to control them[17-18].

Conclusion

In case Macrophytes are growing in the dams, the vegetation induces progressive changes to the water quality. The water quality will needs to be improve by integrated management practices, understanding actual problems and further necessary interactions between the Macrophytes and the aquatic ecosystem is indispensable. There are three basic ways of controlling aquatic weeds like Mechanical, Biological, and chemical control; and as soon as possible it will be implemented. Immediate action should be taken by the authority for to improving the availability of dam water which is mainly used for pisiculture and irrigation purposes by Taluka (where the dam is constructed) of Yavatmal District.

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