BRIEF DOCUMENT OF ASHTAMUDI KAYAL

State / Union Territory : Kerala

Name and address of person(s) compiling this information :

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Section 1: Identification, Location and Jurisdiction

1.1 Name of the Wetland (Alternative names, including in local language should be given in parenthesis after official name) : Ashtamudi Kayal (Ramsar ID - 1204)

1.2 Name of the Village(s) , Tehsil(s), Municipal area (s) :
Villages: Chavara, Neendakara, Thekkumbhagam, Thevalakkara, East Kallada, Kollam, Manroethuruthu, Mangad, Mulavana, Panayam, Perinad, Sakthikulangara, Thrikkadavoor, Thrikkaruva and West Kallada
Taluk : Karunagapally, Kollam , Kunnathur
Panchayaths : Chavara, Neendakara, Thekkumbhagam, Thevalakkara, East Kallada, Manroethuruthu, Perayam, Panayam, Perinad, Thrikkaruva, West Kallada
Corporation : Kollam

1.3 District(s) in which wetland complex is located: Kollam

1.4 Geographical coordinates (Latitude and Longitude, to degree, minutes and second)

: Latitude: From $8^{o}53'28.484"N$ to $9^{o}1'9.485"N$

: Longitude: From $76^{o}31'58.321"E$ to $76^{o}40'7.649"E$

1.5 Name of the Department / Agency which has jurisdiction over the wetland / wetlands complex

: Local Self Governments, Kerala Coastal Zone Management Authority and State Wetland Authority Kerala

Section 2: Site Characteristics

2.1 Area of wetland / wetlands category (ha) : 5290.86 ha.

2.2 Wetland type (Please tick appropriate categories and sub-categories)

Category	Subcategory
❒ Natural (Inland)	❒ Permanent lakes ❒ Seasonal/ intermittent lakes ❒ Permanent streams/ creeks ❒ Seasonal/ intermittent streams/ creeks ❒ Oxbow ❒ River floodplain ❒ Permanent freshwater marshes ❒ Seasonal/ intermittent freshwater marshes ❒ Shrub-dominated wetlands ❒ Tree-dominated wetlands ❒ Geothermal wetlands ❒ Karst and other subterranean hydrological systems
☑ Natural (Coastal)	❒ Coastal lagoon ☑ Estuary ❒ Intertidal mud, sand or salt flats ☑ Mangroves ❒ Coral reefs
❒ Human-made	❒ Aquaculture pond ❒ Tank ❒ Saltpan ❒ Dam / Reservoir

2.3 Depth (m) : Average : 1.8 m Maximum : 9 m

2.4 Elevation (m above mean sea level) : 0 to 1470m (Including Zone of Influence)

2.5 Water regimes

a) Main source of water (tick all applicable)

☑Rainfall ❒ Groundwater ☑ Catchment runoff ☑ Direct / indirect inflow from river

❒ Others, please specify_____

b) Water permanence

☑ Mostly permanent ❒ Mostly intermittent

c) Destination of water from wetland

❒ Feeds groundwater ❒ To downstream catchment ❒ To river ☑ To sea

d) Water pH

❒ Acid (< 5.5) ❒ Circumneutral (5.5 – 7.4) ☑ Alkaline (> 7.4) ❒ Not known

e) Water salinity

❒ Fresh (< 0.5 g/l) ☑ Brackish (0.5 – 30 g/l)) ❒ Euhaline (30- 40 g/l) ❒ Hypersaline (>40g/l)
❒ Not known

f) Nutrient in water

❒ Eutrophic ❒ Mesotrophic ☑ Oligotrophic ❒ Not known

2.6 Climatic setting

a) Annual Rainfall /Snowfall(mm) :2,215.57 mm (average)

b) Temperature (^{o}C) : Minimum - 22^{o}C, Maximum - 33^{o}C

c) Humidity (%) : Minimum - 63%, Maximum - 87%

2.7 Area of zone of influence (in ha) : 155948.58

2.8 (To be enclosed as Annex I and II to this proposal):

2.9 Major land use within zone of influence (provide as approximate % of catchment area)

Forests	: 44.29
Plantation	: 0.86
Agriculture	: 24.77
Settlements (Rural) and (Urban)	: 24.37

Water body	: 5.22
Industrial	: 0.48

2.10 Map of wetland complex and zone of influence

Enclosed as Annexure I and II

Section 3: Biodiversity

3.1 Notable plant species present in wetland

Phytoplanktons: *Achnanthes sp., Bacillaria paradoxa, Nitzschia sigma, Nitzschia sp., Amphora normanii, Amphora sp., Cymbella marina, Diploneis smithii, Fragilaria oceanica, Fragilaria sp., Navicula gracilis, Navicula sp., Pleurosigma aestuarii, Pleurosigma angulatum, Pleurosigma directum, Pleurosigma elongatum, Surirella sp., Asterionella japonica, Pediastrum duplex, Oedogonium sp., Desmidium sp., Spirogyra sp., Coscinodiscus excentricus, Coscinodiscus gigas, Coscinodiscus sublineatus, Melosira sulcata, Synechocystis sp., Trichodesmium thiebautii, Microcystis aeruginosa, Anabaena sp., Lyngbya aestuarii,. Lyngbya confervoides, Oscillatoria limosa, Oscillatoria margaritifera, Oscillatoria sp., Calothrix scopulorum, Ceratium furca, Ceratium tripos, Peridinium sp., Euglena sp., Trachelomonas sp., Ceramium sp., Biddulphia mobiliensis, Climacosphenia moniligera, Cerataulina bergonii, Isthmia sp., Cyclotella meneghiniana, Rhizoclonium sp., Pithophora sp., Ulothrix flacca, Enteromorpha intestinalis, Enteromorpha sp.*

True Mangrove Species: *Acanthus ilicifolius, Avicennia marina, Avicennia officinalis, Lumnitzera racemosa, Excoecaria agallocha, Derris trifoliata, Sonneratia caseolaris, Acrostichum aureum, Bruguiera gymnorrhiza, Ceriops tagal, Rhizophora apiculata*

Associate Mangrove Species: *Alstonia scholaris, Cerbera odollam, Calophyllum inophyllum, Hibiscus tiliaceus, Thespesia populnea , Syzygium travancoricum, Pandanus fascicularis Lam.*

3.2 Notable animal species present in the wetland

Zooplanktons: *Oikopleura sp., Bosminopsis deitersi, Chydorus barroisi, Leydigia sp., Ceriodaphnia cornuta, Moina micrura, Evadne sp., Evadne tergestina, Diaphanosoma sarsi, Diaphanosoma sp., Penilia avirostris, Acartia sp., Undinula sp., Centropages sp., Cyclops sp., Mesocyclops sp. Diaptomus sp., Paradiaptomus sp., Phyllodiaptomus sp., Euchaeta sp., Oithona sp., Acrocalanus sp., Paracalanus sp., Pseudodiaptomus sp., Euterpina sp., Ampelisca scabripes, Indanthura carinata, Apseudes chilkensis, Cirolana fluviatilis, Cirolana willeyi, Corallana nodosa, Corophium triaenonyx, Eriopisa chilkensis, Xenanthura linearis, Quadrivisio bengalensis, Melita zeylanica, Mesopodopsis sp., Mesopodopsis zeylanica, Paranthura plumosa, Photis digitata, Photis geniculate, Sphaeroma terebrans, Tanais estuarius, Tanais sp., Goniada* sp., *Glycera sp., Ophiodromus sp., Lumbrinereis sp., Nephthys sp., Dendronereis sp., Namalycastis indica, Nereis sp., Perinereis sp., Platynereis sp., Diopatra neapolitana, Diopatra sp., Ancistrosyllis constricta, Ancistrosyllis sp., Sabella sp., Mercierella enigmatica, Sthenelais sp., Nerine cirratulus, Polydora ciliata, Polydora sp., Prionospio sp., Opisthosyllis sp., Sagitta bipunctata, Sagitta enflata, Sagitta pulchra, Aurelia sp.*

Molluscs: The survey of molluscan fauna of Ashtamudi estuary recorded the presence of 119 species classified under 3 classes (Polyplacophora, Gastropoda and Bivalvia), 57 families and 96 genera. The species diversity was dominated by the Gastropoda (69 species), followed by the Bivalvia (49 species) and the Polyplacophora (1 species). It includes;

Tegillarca granosa, Villorita cyprinoides, Donax sp., Modiolus plumicens, Musculista senhousia, Perna viridis, Crassostrea bilineata, Saccostrea cucullata, Solen sp., Marcia opima, Meretrix casta, Meretrix meretrix, Paphia malabarica, Protapes gallus, Cerithidea fluviatilis

Fishes: *Acanthurus mata, Ctenochaetus strigosus, Chanda commersonii, Chanda gymnocephalus, Anabas testudineus, Panchax lineatus, Apogon thermalis, Arius dussumieri, Arius maculatus, Arius subrostratus, Arius thalassinus, Pranesus duodecimalis, Horabagrus brachysoma, Mystus gulio, Tylosurus crocodilus, Tylosurus strongylurus, Xenentodon cancila, Alepes djedaba, Alepes para, Atule mate, Carangoides praeustus, Caranx carangus, Caranx ignobilis, Caranx sexfasciatus, Chorinemus sp., Trachinotus blochii, Chanos chanos, Channa punctata, Channa striata, Etroplus maculatus, Etroplus suratensis, Oreochromis mossambicus, Anadontostoma chacunda, Ehirava fluviatilis, Escualosa thoracata, Nematalosa nasus, Sardinella albella, Sardinella fimbriata, Sardinella longiceps, Cynoglossus bilineatus, Cynoglossus lida, Cynoglossus lingua, Cynoglossus macrostomus, Cynoglossus puncticeps, Paraplagusia bilineata, Danio aequipinnatus, Puntius amphibius, Puntius filamentosus, Puntius mahecola, Puntius sarana, Puntius vittatus, Rasbora daniconius, Drepane punctata, Dussumieria acuta, Butis butis, Eleotris fusca, Elops machnata, Stolephorus commersonii, Stolephorus indicus, Thryssa hamiltonii, Thryssa malabarica, Thryssa mystax, Thryssa purava, Thryssa setirostris, Epinephelus diacanthus, Epinephelus malabaricus, Epinephelus tauvina, Gerromorpha setifer, Gerres abbreviatus, Gerres oblongus, Gerres oyena, Pertica filamentosa, Acentrogobius caninus, Acentrogobius chlorostigmatoides, Acentrogobius cyanomos, Acentrogobius reichei, Bathygobius fuscus, Brachyamblyopus urolepis, Glossogobius biocellatus, Glossogobius giuris, Odontamblyopus rubicundus, Oligolepis acutipennis, Oxyurichthys formosanus, Oxyurichthys microlepis, Oxyurichthys tentacularis, Trypauchen vagina, Pomadasys hasta, Hyporhamphus limbatus, Hyporhamphus xanthopterus, Zenarchopterus buffonis, Zenarchopterus dispar, Gazza minuta, Leiognathus bindus, Leiognathus blochii, Leiognathus equulus, Leiognathus lineolatus, Leiognathus splendens, Secutor insidiator, Secutor ruconius, Lethrinus nebulosus, Lutjanus argentimaculatus, Lutjanus fulviflamma, Lutjanus johni, Lutjanus russelli, Megalops cyprinoides, Monodactylus argenteus, Liza macrolepis, Liza parsia, Liza tade, Mugil cephalus, Osteomugil cunnesius,Valamugil buchanani, Valamugil seheli, Parupeneus indicus, Muraenesox cinereus, Ophichthus microcephalus, Ostracion lentiginosus, Pseudorhombus triocellatus, Platycephalus cantori, Platycephalus indicus, Plotosus lineatus, Pomacanthus annularis, Pomacentrus cyanomos, Ilisha melastoma, Scatophagus argus, Daysciaena albida, Cephalopholis pachycentron, Siganus canaliculatus, Siganus javus, Sillago sihama, Callichrous sp., Brachirus orientalis, Synaptura commersonii, Acanthopagrus berda, Sphyraena jello, Doryichthys cuncalus, Autisthes puta, Pelates quadrilineatus, Therapon jarbua, Terapon theraps, Arothron hispidus, Chelonodon patoca, Tetraodon fluviatilis, Tetraodon immaculatus, Triacanthus brevirostris*

Also recorded two species for the first time from the lake, which included the tripod fish *Tricanthus bicaculeatus* (local name Muppiri), and Queenfish, *Scomberoides lysan* (Cheru paara) as per the latest census report by ATREE, 2022.

Shrimps and Prawns: *Macrobrachium rosenbergii, Fenneropenaeus indicus, Marsupenaeus japonicus, Metapenaeus affinis, Metapenaeus dobsoni, Metapenaeus monoceros, Parapenaeopsis stylifera, Penaeus canaliculatus, Penaeus indicus, Penaeus latisulcatus, Penaeus monodon, Penaeus semisulcatus*

Crabs: *Charybdis (Charybdis) feriata, Portunus (Portunus) pelagicus, Portunus (Portunus) sanguinolentus, Scylla serrata, Scylla tranquebarica*

Birds: *Prinia socialis, Artamus fuscus, Merops orientalis, Anastomus oscitans, Porzana pusilla, Hirundo rustica, Limosa lapponica, Ploceus philippinus, Ixobrychus flavicollis, Dicrurus macrocercus, Milvus migrans, Halcyon pileata, Nycticorax nycticorax, Lalage melanoptera, Larus ridibundus,*

Threskiornis melanocephalus, Dinopium benghalense, Limosa limosa, Himantopus himantopus, Merops philippinus, Haliastur indus, Limicola falcinellus, Dicrurus aeneus, Metopidius indicus, Larus brunnicephalus, Sterna caspia, Bubulcus ibis, Petronia xanthocollis, Ixobrychus cinnamomeus, Acrocephalus stentoreus, Todiramphus chloris, Fulica atra, Tringa nebularia, Falco tinnunculus, Alcedo atthis, Gallinula chloropus, Tringa totanus, Actitis hypoleucos, Gallinago gallinago, Orthotomus sutorius, Anas crecca, Sterna hirundo, Nettapus coromandelianus, Calidris ferruginea, Surniculus lugubris, Calandrella dukhunensis, Numenius arquata, Haematopus ostralegus, Aythya nyroca, Anas querquedula, Phalacrocorax carbo, Sterna bergii, Ardea alba, Charadrius leschenaultii, Tringa ochropus, Ardea cinerea, Pluvialis squatarola, Motacilla cinerea, Gelochelidon nilotica, Larus argentatus, Corvus splendens, Phalacrocorax fuscicollis, Terpsiphone paradisi, Ardeola grayii, Anas poecilorhyncha, Ardea intermedia, Charadrius alexandrines, Coracina macei, Sterna bengalensis, Fregata ariel, Charadrius mongolus, Dendrocygna javanica, Phalacrocorax niger, Egretta garzetta, Tachybaptus ruficollis, Charadrius dubius, Calidris minuta, Sterna albifrons, Tringa stagnatilis, Strix ocellata, Anas acuta, Anhinga melanogaster, Copsychus saularis, Alauda gulgula, Pandion haliaetus, Pluvialis fulva, Larus ichthyaetus, Falco peregrinus, Hydrophasianus chirurgus, Ceryle rudis, Gallinago stenura, Psittacula cyanocephala, Ardea purpurea, Porphyrio porphyria, Vanellus indicus, Anthus richardi, Psittacula krameri, Pericrocotus cinnamomeus, Pelecanus philippensis, Pelargopsis capensis, Ploceus manyar, Butorides striata, Loriculus vernalis, Gallicrex cinerea, Circus aeruginosus, Egretta gularis, Numenius phaeopus, Chlidonias hybrida, Haliaeetus leucogaster, Amaurornis phoenicurus, Rhipidura aureola, Motacilla maderaspatensis, Halcyon smyrnensis, Tringa glareola, Ixobrychus sinensis, Motacilla flava,

3.3 Species of conservation significance (rare, endangered, threatened, endemic species)

Horabagrus brachysoma, Oreochromis mossambicus, Cynoglossus macrostomus, Hyporhamphus xanthopterus, Pomacentrus cyanomos, Halcyon pileata (VU), *Limosa lapponica, Threskiornis melanocephalus, Calidris ferruginea,Numenius arquata, Haematopus ostralegus, Aythya nyroca, Anhinga melanogaster, Pelecanus philippensis* (NT), *Syzygium travancoricum*(CR)

Similarly, *Lumnitzera racemosa*, one of the rare mangrove species in Kerala, has shown its restricted distribution in the Asramam area. *Ceriops tagal*, believed to be extinct in Kerala coast was rediscovered from Vincent Island of Kollam district. Cat fish community. *Calamus rotang* (plant species) is endemic.

3.4 Major plant invasive alien species

Eichornia crassipes

3.5 Major animal invasive alien species

Ashtamudi Lake is worst-hit due to Charu mussel. Here, Charu mussel has replaced the Asian green mussel (*Perna viridis*) and the edible oyster *Magallana bilineata* (known locally as muringa).

Section 4: Ecosystem services

Importance	Relevant for the site (please tick yes or no)	If Yes, Details (upto 50 words for each category)
Source of drinking water for people living and around	❒ Yes ☑ No	
Source of water for agriculture	❒ Yes ☑ No	
Fisheries	☑ Yes ❒ No	The estuary is a rich source of fish, prawn, crab and clam resources. Commercial fisheries are reported to comprise 57 fish, 6 shrimp, 1 prawn, 5 crab and 6 bivalve species. These include a range of true estuarine, marine migrant and resident species. This estuarine system also contributes approximately 80% of the total clam export trade of India and provides livelihoods for at least 3,000 local peoples.
Cultivation of aquatic food plants	❒ Yes ☑ No	
For buffalo wallowing and use of domesticated animals	❒ Yes ☑ No	
Medicinal plants	❒ Yes ☑ No	
Is a site for recreation and tourism	☑ Yes ❒ No	Ashtamudi is famed as an entry to the Kerala backwaters, visited by nearly 20,000 tourists annually and providing a source of income to nearly 50 houseboat-owners and employees. It was estimated that annual tourist inflow generate benefit around Rs.1.50 million from recreation
Buffering communities from extreme events as floods and storms	☑ Yes ❒ No	Local communities of Munroethuruthu are shielded from severe floods due to the presence of the wetland
Groundwater recharge	☑ Yes ❒ No	Not quantitatively assessed
Water purification	☑ Yes ❒ No	Not quantitatively assessed

Importance	Relevant for the site (please tick yes or no)	If Yes, Details (upto 50 words for each category)
Acts as a sink for sediments	☑ Yes ❒ No	No detailed studies of estuary sedimentation are available. Hydrological investigation within the estuary indicates high input of sediments from the littoral end. Sedimentation is taking place from the north eastern end by the Kallada River
Has significant cultural and religious values	☑ Yes ❒ No	Boat races in the lake are conducted annually.
Supports noteworthy plants species	☑ Yes ❒ No	Recorded diversity within the wetland complex includes over 70 plant species. These include 1 critically endangered (*Syzygium travancoricum)*, 2 vulnerable species (*Horabagrus brachysoma Calamus rotang)*. The wetland supports plant species as mentioned in section 3.1 also.
Supports noteworthy animal species	☑ Yes ❒ No	Supports animal species as mentioned in section 3.2
Site of high congregation of migratory water birds	☑ Yes ❒ No	Over 60 species of migratory waterbirds are documented in this wetland.
Supports life cycle of fish or amphibians	☑ Yes ❒ No	Detailed quantitative assessments are absent.
Mining	☑ Yes ❒ No	Sand mining from Kallada river confluence sites are reported from Ashtamudi estuary
Any other, please list		

Section 5: Pre-Existing Rights and Privileges

Nature of right and privilege	Relevant for the site (please tick yes or no)	Does this negatively impact the wetland's ecological health?	Brief description (upto 50 words for each category)
Community Fishing (without any lease or permission from government department)	☑ Yes ❒ No	❒ Yes ☑No ❒ Not assessed	Commercial fisheries are reported to comprise 57 fish, 6 shrimp, 1 prawn, 5 crab and 6 bivalve species.
Fishing under lease from government department	☑Yes ❒ No	❒ Yes ❒ No	Aqua culture units are run by the Fisheries Department.

Nature of right and privilege	Relevant for the site (please tick yes or no)	Does this negatively impact the wetland's ecological health?	Brief description (upto 50 words for each category)
		❒ Not assessed	
Harvest of plants (without any lease or permission from government department)	❒ Yes ☑ No	❒ Yes ❒ No ❒ Not assessed	-
Harvest of plants under lease from government department	❒ Yes ☑ No	❒ Yes ❒ No ❒ Not assessed	-
Agriculture or horticulture within wetland	❒ Yes ☑ No	❒ Yes ❒ No ❒ Not assessed	-
Grazing	❒ Yes ☑ No	❒ Yes ❒ No ❒ Not assessed	-
Religious practices	☑ Yes ❒ No	❒ Yes ☑ No ❒ Not assessed	Religious boat trips are conducted annually in the estuary
Withdrawal of water for domestic use	❒ Yes ☑ No	❒ Yes ❒ No ❒ Not assessed	-
Withdrawal of water for agriculture or fisheries	☑ Yes ❒ No	❒ Yes ❒ No ☑ Not assessed	Not assessed quantitatively
Bathing or wallowing of domestic animals	☑ Yes ❒ No	❒ Yes ❒ No ☑ Not assessed	Not assessed quantitatively
Plying of boats	☑ Yes ❒ No	❒ Yes ☑ No ❒ Not assessed	Ashtamudi estuary is the entrance to the Cochin backwaters which supports a significant number of house boats, fishery boats and passenger commuting boats in the wetland.
Any other, please list here	❒ Yes ❒ No	❒ Yes ❒ No ❒ Not assessed	

Section 6: Present and Potential Threats

Threat	Degree	Present or Potential	Additional information, if any
Changes in water inflow and outflow	❒ High ☑ Medium ❒ Low	❒ Present ☑ Potential	The estuary is gradually shifting to a marine dominated stage on account of over 40 per cent reduction of freshwater inflows from Kallada River and increasing sea level. It is also reported a qualitative shift towards marine influenced sedimentary OM in the estuary.
Pollution	❒ High ☑ Medium ❒ Low	☑ Present ❒ Potential	Insufficient waste treatment infrastructure for Kollam City. Inadequate waste treatment facility within the houseboats. Inadequate waste treatment and management facilities in industrial units. Unsafe sanitation technologies in use for over half of the settlements around the estuary. Also reported that low to moderately polluted areas in the estuary by trace elements due to the combination of untreated drainage and waste materials. The southern area of the estuary is reported as the relatively most polluted site.
Unsustainable harvest of biological resources	❒ High ❒ Medium ☑ Low	☑ Present ❒ Potential	Unsustainable harvest of fishes using illegal methods are reported from the estuary. Quantitative assessment required.
Mining	❒ High ❒ Medium ☑ Low	☑ Present ❒ Potential	Sand mining has been reported in the Kallada River zone and along the northern shore of Ashtamudi lake. The sand mining activity will lead to deepening of the riverbed,

Threat	Degree	Present or Potential	Additional information, if any
			which will reduce the natural filtering capacity of the river.
Siltation	❒ High ❒ Medium ☑ Low	☑ Present ❒ Potential	Altered hydrodynamics, due to frequent dredging and other physical activities in the estuary lead to increased siltation from the sea
Encroachment	❒ High ❒ Medium ❒ Low	❒ Present ❒ Potential	No data available
Spread of invasive species	❒ High ☑ Medium ❒ Low	☑ Present ❒ Potential	The lake is hit by the invasion of Charu mussel. Here, Charru mussel has replaced the Asian green mussel (*Perna viridis*) and the edible oyster *Magallana bilineata* (known locally as 'Muringa').
Illegal boat dismantling yards	❒ High ☑ Medium ❒ Low	☑ Present ❒ Potential	These yards are reported by the public which pollute the estuary by leftovers such as thermocol and other boat parts, but not assessed quantitatively
Microbial contamination in the shellfishes	❒ High ☑ Medium ❒ Low	☑ Present ❒ Potential	Microbiological contamination in shellfish harvesting areas in the Ashtamudi was identified
Any other, please list	❒ High ❒ Medium ❒ Low	❒ Present ❒ Potential	

Section 7: Activities Proposed to be prohibited (other than those listed in Rule 4(2) of Wetlands Rules)

Activity	Place a tick mark if relevant	Prohibition within wetlands or zone of influence	Level of Prohibition (in terms of people, restricted area or any other)	Name of department / agency responsible for prohibition	Additional information, if any
Any other, please list	❒	❒ Wetland / Wetlands			

Activity	Place a tick mark if relevant	Prohibition within wetlands or zone of influence	Level of Prohibition (in terms of people, restricted area or any other)	Name of department / agency responsible for prohibition	Additional information, if any
		complex boundary ❒ Zone of influence			

Section 8: Activities Proposed to be regulated

Activity	Place a tick mark if relevant	Regulation within wetlands or zone of influence	Level of regulation (in terms of people, restricted area or any other)	Name of department / agency responsible for regulation	Additional information, if any
Withdrawal of water for commercial purposes / impoundment/diversion or any other hydrological intervention	☑	☑ Wetland / Wetlands complex boundary ☑ Zone of influence	Whole Kallada River basin	SWAK, Wetland Management Unit, Irrigation Department and LSGs	Prior permission and monitoring are required from relevant agencies
Discharge of treated sewage/ effluent / wastewater	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Within the wetland	SWAK, Wetland Management Unit, Irrigation Department, Pollution Control Board, LSGs, KCZMA	Prior permission and monitoring are required from relevant agencies
Aquaculture, agriculture and horticulture activities within the wetland boundaries.	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Unscientific/ polluting aqua/agri-culture activities has to be regulated	SWAK, Wetland Management Unit, Fisheries Department	Prior permission and monitoring are required from

Activity	Place a tick mark if relevant	Regulation within wetlands or zone of influence	Level of regulation (in terms of people, restricted area or any other)	Name of department / agency responsible for regulation	Additional information, if any
			within the wetland.	, Agriculture Department, LSGs	relevant agencies
Soil erosion and siltation	☑	☑ Wetland / Wetlands complex boundary ☑ Zone of influence	Activities to be regulated in the catchment area.	SWAK, Wetland Management Unit, Soil Conservation Department, LSGs	Monitoring required by relevant agencies
Any other, please list	❒	❒ Wetland / Wetlands complex boundary ❒ Zone of influence			

Section 9: Activities Proposed to be permitted

Activity	Place a tick mark if relevant	Within wetlands or zone of influence	Additional information, if any
Traditional fishing and mussel/clam collection of all kinds	☑	☑ Wetland / Wetlands complex boundary ☑ Zone of influence	Ensure the local livelihood of the fringe community who are directly depend upon the wetland
	❒	❒ Wetland / Wetlands complex boundary ❒ Zone of influence	

Section 10: Listing of Available Scientific Resources Used

Hussain, S.M., Anbalagan, S., Kumar, K.S., Neelavannan, K., Pradhap, D., Radhakrishnan, K., Godson, P.S. and Krishnakumar, S., 2020. A baseline study on elemental concentration and potential ecological risk status of the surface sediments of Ashtamudi Lake, south west coast of India. *Marine Pollution Bulletin*, *158*, p.111410.

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Ampili, M. and Shiny, S. K., 2016. Hydrologic and sediment parameters affecting the distribution of the Venerid clam, *Paphia malabarica* in two estuaries. International Journal of Scientific and Research Publications, 6(3), pp. 15- 30.

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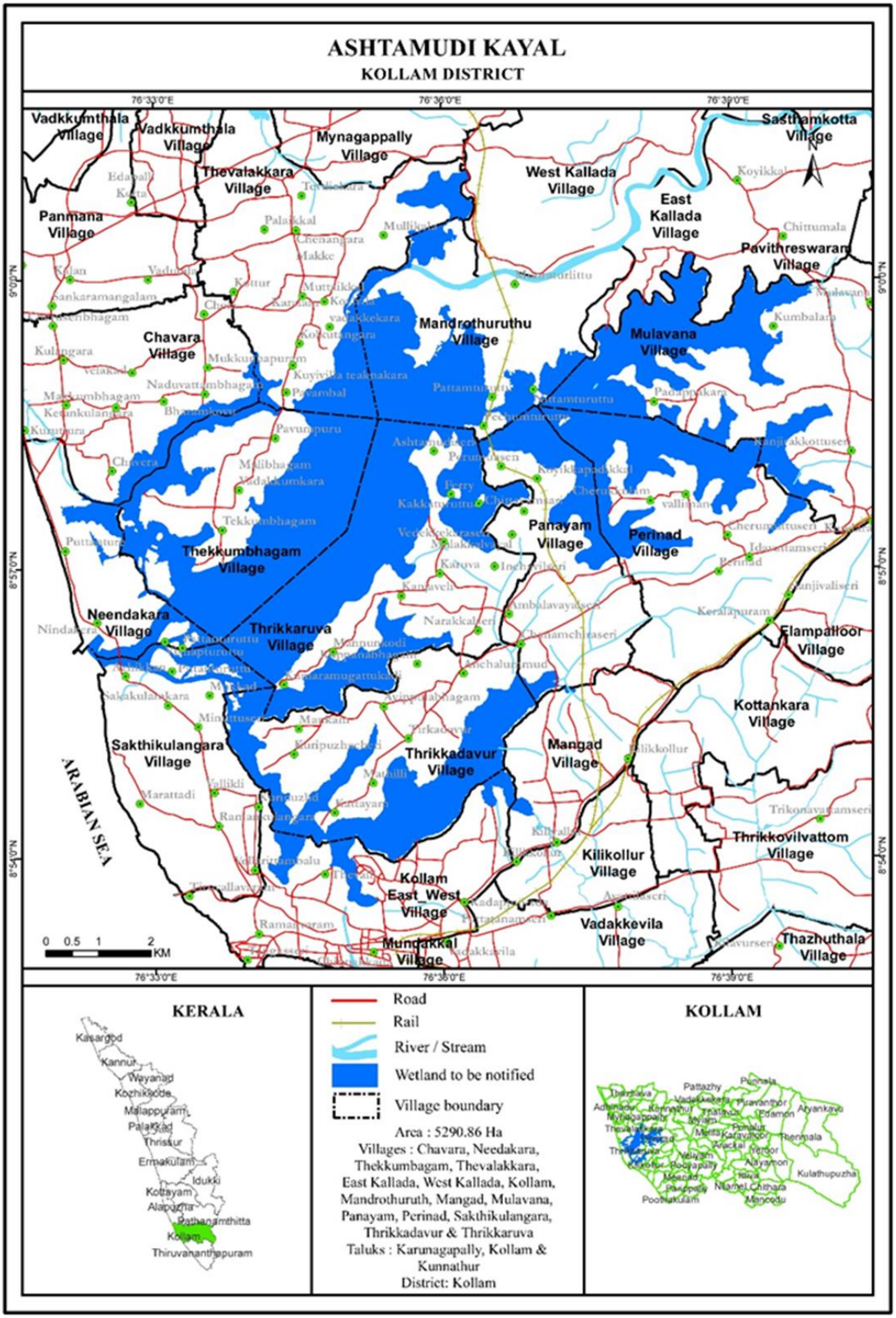
CHECKLIST

- ☑ Responsible agency has been clearly identified and details of contact person included
- ❒ Wetland/ wetlands complex boundary has been delineated using GIS and firmed up by adequate ground truthing
- ☑ Wetland/ wetlands complex map has been provided at required scale
- ☑ Zone of influence has been delineated and included in wetland map or a separate map
- ☑ Wetland zone of influence is sufficient to manage all activities
- ☑ Site's importance have been listed, and for major categories, justification is provided
- ☑ Site's biodiversity values are listed, and for major categories, justification is provided
- ❒ List of pre-existing rights and privileges is provided
- ❒ Consistency or inconsistency of pre-existing rights and privileges is indicated to be best of available knowledge
- ☑ Threats to site are listed, and for major categories details are provided
- ❒ Activities prohibited, beyond those already listed in Rule 4(2) have been mentioned
- ❒ List of activities to be regulated within wetlands and zone of influence is provided
- ❒ List of activities to be permitted is provided

Annexure I : *Location map of Lake*



Annexure II : *Zone of influence Map*