

BRIEF DOCUMENT OF AKKULAM-VELI KAYAL

State / Union Territory : Kerala

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

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2. Dr. Jissy Jyothi, Environmental Officer, Directorate of Environment and Climate Change, Govt. of Kerala, 4th Floor, KSRTC Terminal Complex, Thampanoor, Thiruvananthapuram-1.

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) : Akkulam-Veli Kayal

1.2 Name of the Village(s) , Tehsil(s), Municipal area (s) :

Villages	: Attipra, Cheruvakkal & Kadagampally
Taluk	: Thiruvananthapuram
Panchayaths	: Nil
Corporation	: Thiruvananthapuram

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

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

: Latitude: From **8°30'26.328"N** to **8°31'51.028"N**

: Longitude: From **76°53'6.45"E** to **76°54'37.046"E**

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

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

Section 2: Site Characteristics

2.1 Area of wetland / wetlands category (ha) : 95.78 Ha

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

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

2.3 Depth (m) : Average 2.4 M

2.4 Elevation (m above mean sea level) : 0 to 140m (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): **1774 mm**

b) Temperature (°C) : **26.6 °C**

c) Humidity (%) :No data available

2.7 Area of zone of influence (in ha) : 13900.09ha

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

Forests : 0.00

Plantation : 0.10

Agriculture : 16.83

Settlements (Rural) and (Urban) : 82.19

Water body : 0.61

Industrial : 0.28

2.9 Map of wetland complex and zone of influence

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

Section 3: Biodiversity

3.1 Notable plant species present in wetland

Diatoms : *Actinocyclus normanii*, *Amphora holsatica*, *Amphora ovalis*, *Ardissonea sp.*, *Cyclotella atomus*, *Cyclotella meneghiniana*, *Cyclotella striata*, *Diadেসmis confervacea*, *Diploneis finnica*, *Krasskella*, *Navicula sp.*, *Navicula elongtoids*, *Navicula yarrensensis*, *Pinnularia sp.*, *Pliocaenicus*, *Pseudo-nitzschia*, *Stauroforma*, *Tabularia fasciculata*

3.2 Notable animal species present in wetland

Fishes : *Etroplus suratensis*, *Megalops cyprinoides*, *Anguilla bicolor*, *Stolephorus indicus*, *Chanos chanos*, *Puntius filamentosus*, *Puntius sarana*, *Puntius vittatus*, *Rasbora daniconius*, *Mystus gulio*, *Clarias gariepinus*, *Heteropneustes fossilis*, *Liza tade*, *Mugil cephalus*, *Aplocheilus lineatus*, *Ambassis ambassis*, *Lates calcarifer*, *Sillago sihama*, *Caranx hippos*, *Caranx melampyus*, *Secutor insidiator*, *Lutjanus argentimaculatus*, *Gerres filamentosus*, *Terapon jarbua*, *Etroplus maculatus*, *Oreochromis mossambicus*, *Eleotris fusca*, *Glossogobius giuris*, *Oxyurichthys microlepis*, *Siganus javus*, *Anabas testudineus*, *Channa marulia*, *Channa striata*, *Apistus carinatus*, *Platycephalus indicus*.

Butterflies: Common Banded Awl (*Hasora chromus*), Plain Banded Awl (*Hasora vitta*) Suffused Snow Flat (*Tagiades gana*), Water Snow Flat (*Tagiades litigiosa*), Bush Hopper (*Ampittia dioscorides*), Chestnut Bob (*Iambrix salsala*), Grass Demon (*Udaspes folus*), Indian Palm Bob (*Suastus gremius*), Common Redeye (*Matapa aria*), Rice Swift (*Borbo cinnara*), Ceylon Swift (*Parnara bada*), Conjoined Swift (*Pelopidas conjuncta*), Contiguous Swift (*Polytremis lubricans*), Blank Swift (*Caltoris kumara*), Indian Dartlet (*Oriens goloides*), Pale Palm Dart (*Telicota colon*), Dark Palm Dart (*Telicota aneilla*), Southern Bluebottle (*Graphium teredon*), Common Jay (*Graphium doson*), Common Rose (*Pachliopta aristolochiae*), Crimson Rose (*Pachliopta hector*), Southern Birdwing (*Troides minos*), Common Mime (*Papilio clytia*), Common Mormon (*Papilio polytes*), Blue Mormon (*Papilio polymnestor*), Lime Butterfly (*Papilio demoleus*), Common Grass Yellow (*Eurema hecabe*), Common Emigrant (*Catopsilia pomona*), Mottled Emigrant (*Catopsilia pyranthe*), Common Jezebel (*Delias eucharis*), Psyche (*Leptosia nina*), Indian Sunbeam (*Curetis thetis*), Angled Pierrot (*Caleta decidia*), Banded Blue Pierrot (*Discolampa ethion*), Dark Cerulean (*Jamides bochus*), Common Cerulean

(*Jamides celeno*), Common Pierrot (*Castalius rosimon*), Lesser Grass Blue (*Zizina otis*), Tiny Grass Blue (*Zizula hylax*), Indian Cupid (*Everes lacturnus*), Common Hedge Blue (*Acytolepis puspa*), Gram Blue (*Euchrysops cnejus*), Centaur Oakblue (*Arhopala centaurus*), Monkey Puzzle (*Rathinda amor*), Slate Flash (*Rapala manea*), Glassy Tiger (*Parantica aglea*), Blue Tiger (*Tirumala limniace*), Plain Tiger (*Danaus chrysippus*), Common Crow (*Euploea core*), Southern Palmfly (*Elymnias caudata*), Common Evening Brown (*Melanitis leda*), Common Bushbrown (*Mycalesis perseus*), Nigger (*Orsotrioena medus*), Common Five-ring (*Ypthima baldus*), Common Four-ring (*Ypthima huebneri*), Tawny Coster (*Acraea violae*), Rustic (*Cupha erymanthis*), Commander (*Moduza procris*), Common Sailer (*Neptis hylas*), Chestnut-streaked Sailer (*Neptis jumbah*), Common Baron (*Euthalia aconthea*), Grey Count (*Cynthia lepidea*), Common Castor (*Ariadne merione*), Chocolate Pansy (*Junonia iphita*), Grey Pansy (*Junonia atlites*), Peacock Pansy (*Junonia almana*), Great Eggfly (*Hypolimnas bolina*)

Odonates : Clear-winged Forest Glory (*Vestalis gracilis*), River Heliodor (*Libellago indica*), White Dartlet (*Agriocnemis pieris*), Pygmy Dartlet (*Agriocnemis pygmaea*), Orange-tailed Marsh Dart (*Ceriagrion cerinorubellum*), Coromandel Marsh Dart (*Ceriagrion coromandelianum*), Senegal Golden Darlet (*Ischnura senegalensis*), Black Marsh Dart (*Onychargia atrocyana*), Green Striped Marsh Dart (*Pseudagrion decorum*), Blue Grass Dart (*Pseudagrion microcephalum*), Saffron-faced Grass Dart (*Pseudagrion rubriceps*), Emerald Spreadwing (*Leste elatus*), Yellow Bush Dart (*Copera marginipes*), Black Bambootail (*Prodasineura verticalis*), Common Clubtail (*Ictinogomphus rapax*), Trumpet-Tail (*Acisoma panorpoides*), Scarlet Marsh Hawk (*Aethriamanta brevipennis*), Rufous Backed Marsh Hawk (*Brachydiplax chalybea*), Ditch Jewel (*Brachythemis contaminata*), Ruddy Marsh Skimmer (*Crocothemis servilia*), Ground Skimmer (*Diplacodes trivialis*), Pied Paddy Skimmer (*Neurothemis tullia*), Green Marsh Hawk (*Orthetrum Sabina*), Wandering Glider (*Pantala flavescens*), Rufous Marsh Glider (*Rhodothermis rufa*), Common Picture Wing (*Rhyothemis variegata*), Coral-tailed Cloudwing (*Tholymis tillarga*), Black Marsh Trotter (*Tamea limbata*), Long-legged Marsh Glider (*Trithemis pallidinervis*), Greater Crimson Glider (*Urothemis signata*)

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

Anhinga melanogaster (NT), *Anguilla bicolor* (NT), *Anguilla bengalensis* (NT), *Aquila nipalensis* (EN), *Clanga clanga* (VU), *Etroplus suratensis* (Endemic)

3.4 Major plant invasive alien species

Eichornia crassipes

3.5 Major animal invasive alien species

The Mozambique Tilapia *Oreochromis mossambicus* and the African catfish *Clarias gariepinus*.

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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	-
Source of water for agriculture	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	-
Fisheries	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	-
Cultivation of aquatic food plants	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	-
For buffalo wallowing and use of domesticated animals	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	-
Medicinal plants	<input type="checkbox"/> Yes <input type="checkbox"/> No	No data available
Buffering communities from extreme events as floods and storms	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Quantitative data not available
Groundwater recharge	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Quantitative data not available
Water purification	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Quantitative data not available
Acts as a sink for sediments	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Not assessed quantitatively
Has significant cultural and religious values	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	-
Is a site for recreation and tourism	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Akkulam Tourist village and Akkulam Boat Club are the major picnic spots in the area. A small park was recently built near the lake for recreational activities.
Supports noteworthy plants species	<input type="checkbox"/> Yes <input type="checkbox"/> No	Supports plant species as mentioned in section 3.1
Supports noteworthy animal species	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Supports animal species as mentioned in section 3.2
Site of high congregation of migratory water birds	<input type="checkbox"/> Yes <input type="checkbox"/> No	No data available

Importance	Relevant for the site (please tick yes or no)	If Yes, Details (upto 50 words for each category)
Supports life cycle of fish or amphibians	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Support life cycle of several fish species specially <i>Anguilla bicolor</i> a near threatened fish species.
Mining	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
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)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not assessed	Local inhabitants used to collect fishes for their livelihood.
Fishing under lease from government department	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Harvest of plants (without any lease or permission from government department)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Harvest of plants under lease from government department	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Agriculture or horticulture within wetland	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Grazing	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Religious practices	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Withdrawal of water for domestic use	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-

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)
Withdrawal of water for agriculture or fisheries	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Bathing or wallowing of domestic animals	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	-
Plying of boats	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not assessed	The Akkulam-Veli lake together with the tourist village make a good picnic spot and the main attraction is the boating.
Any other, please list here	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not assessed	

Section 6: Present and Potential Threats

Threat	Degree	Present or Potential	Additional information, if any
Changes in water inflow and outflow	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low	<input checked="" type="checkbox"/> Present <input type="checkbox"/> Potential	Not assessed quantitatively
Pollution	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	<input type="checkbox"/> Present <input checked="" type="checkbox"/> Potential	1. The pollution index HFBI values in the lake ranged from 6.63 to 8.25, indicating very poor water quality. The diatom analysis reveals diverse species dwelling in the lake, and high population and wide distribution of species such as <i>Cyclotella</i> and <i>Navicula</i> display high organic pollution. This demands careful planning for mitigation and monitoring of environmental pollution of the lake. 2. The lake sediments could be regarded as

Threat	Degree	Present or Potential	Additional information, if any
			'environmental archives' in evaluating the heavy metal burden of the lake. The concentrations of heavy metals and major elements in the sediments of the lake indicate that the lake is almost uniformly contaminated. The presence of a sand barrier between the lakes limits flushing of contaminants into the sea, triggering enhanced heavy metal burden. This may further enhance the pollution load and damage the already fragile lake ecosystem
Siltation	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	<input checked="" type="checkbox"/> Present <input type="checkbox"/> Potential	Siltation is the main cause of low water depth especially in the central portion of the Aakkulam-Veli lake
Encroachment	<input type="checkbox"/> High <input type="checkbox"/> Medium <input checked="" type="checkbox"/> Low	<input checked="" type="checkbox"/> Present <input type="checkbox"/> Potential	Quantitative data not available
Spread of invasive species	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	<input checked="" type="checkbox"/> Present <input type="checkbox"/> Potential	Water hyacinth is the main invading species
Any other, please list	<input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	<input type="checkbox"/> Present <input type="checkbox"/> Potential	

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

Activity	Prohibited within wetlands or zone of influence	Details of specific area wherein activity is prohibited	Name of department / agency responsible for regulation	Additional information, if any
	<input type="checkbox"/> Wetland / Wetlands complex boundary			

	<input type="checkbox"/> Zone of influence			
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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 / impoundment/diversion or any other hydrological intervention	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Wetland / Wetlands complex boundary <input checked="" type="checkbox"/> Zone of influence	-	SWAK, Wetland Management Unit, Irrigation Department, LSG, District Collector	Necessary to maintain the hydrological integrity and the wetland ecosystem health
Harvesting of resources (living / non-living)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Wetland / Wetlands complex boundary <input type="checkbox"/> Zone of influence	-	SWAK, Wetland Management Unit, LSG, District Collector	The wetland ecosystem health should be maintained
Discharge of treated sewage/ effluent / wastewater	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Wetland / Wetlands complex boundary <input type="checkbox"/> Zone of influence	-	SWAK, Wetland Management Unit, LSG, Pollution Control Board, District Collector	Needed to maintain the wetland ecosystem health
Construction of boat jetties, and facilities for temporary use, as pontoon bridges	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Wetland / Wetlands complex boundary <input type="checkbox"/> Zone of influence	Unrestricted construction of boat jetties shall be regulated	SWAK, Wetland Management Unit, LSG, District Collector	Need to get prior permission from WMU/SWAK to maintain the

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
					wetland ecosystem health.
Any other, please list	<input type="checkbox"/>	<input type="checkbox"/> Wetland / Wetlands complex boundary <input type="checkbox"/> 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
Sediment/silt removal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Wetland / Wetlands complex boundary <input type="checkbox"/> Zone of influence	To be removed based on a detailed assessment
	<input type="checkbox"/>	<input type="checkbox"/> Wetland / Wetlands complex boundary <input type="checkbox"/> Zone of influence	

Section 10: Listing of Available Scientific Resources Used

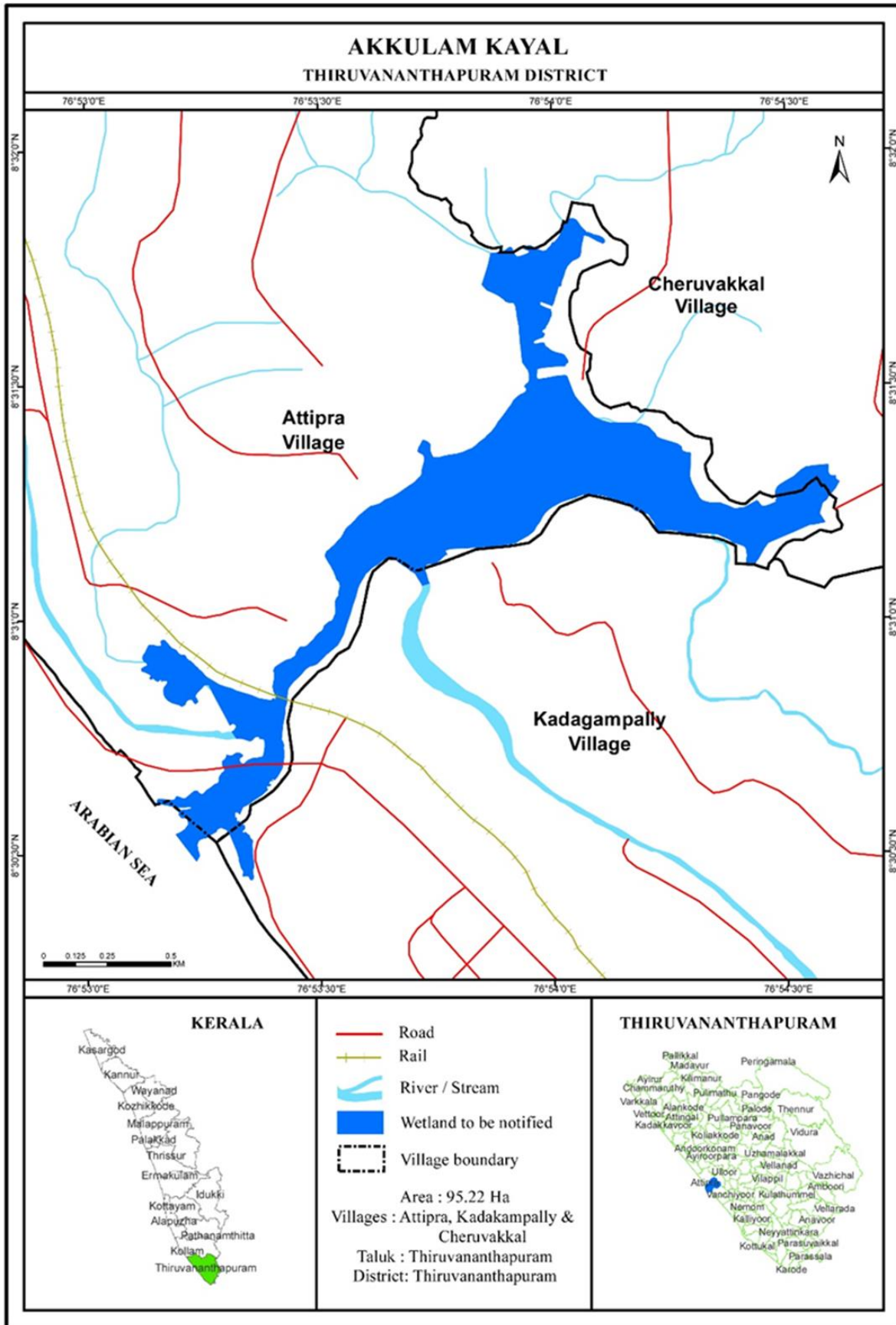
1. Shah, R.A., Achyuthan, H., Puthan-Veetil, R.S., Derwaish, U. and Rafiq, M., 2019. Sediment distribution pattern and environmental implications of physico-chemical characteristics of the Akkulam-Veli Lake, South India. *Applied Water Science*, 9(8), pp.1-11.

2. Sheela, A.M., Letha, J. and Joseph, S., 2011. Environmental status of a tropical lake system. *Environmental monitoring and assessment*, 180(1), pp.427-449.
3. Kumar C.S and R.S Gokul, 2022, Checklist of Butterflies of Akkulam Lake, Thiruvananthapuram, Prakrithi Books
4. Regi, S.R. and Bijukumar, A., 2012. Diversity of Fish Fauna from Veli-Akkulam Lake, Kerala, India. *Environment and Ecology*, 30(4), pp.1381-1383.
5. Kumar C.S, 2022 Checklist of Odonates of Akkulam Lake.

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 :



Annexure II :

