BRIEF DOCUMENT OF VELLAYANI LAKE

State / Union Territory : Kerala

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

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2. Dr. Lakshmi P. M., Environmental Scientist, 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) : **Vellayani Lake**

1.2 Name of the Village(s) , Tehsil(s), Municipal area (s) :
Villages : Kalliyoor, Thiruvallam, Venganoor
Panchayats : Kalliyoor, Pallichal, Veganoor
Corporation : Nemom and Thiruvallom corporation zones

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°24’09” to 8°26’30”
: Longitude: From 76°59’08” to 76°59’47”

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

: State Wetland Authority Kerala, Irrigation Department and the Local Self Governments.

Section 2: Site Characteristics

2.1 Area of wetland / wetlands category (ha) : 262.68 ha

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

Category	Subcategory
☑ Natural (Inland)	☑ Permanent lakes ❒ Seasonal/ intermittent lakes

Category	Subcategory
	❒ 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) : Maximum - 7, Minimum - 1.5

2.4 Elevation (m above mean sea level) : 20 - 80 MSL (including the 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) :1600 mm

b) Temperature (°C) : Minimum - 20.8, Maximum 34.5 °C

c) Humidity (%) : Minimum - 59%, Maximum - 79 %

2.7 Area of zone of influence (in ha) : 4068.81ha

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

Forests	: 00.00
Plantation	: 00.28
Agriculture	: 14.10
Settlements (Rural) and (Urban)	: 78.61
Water body	: 07.01
Industrial	: 00.00

2.9 Map of wetland complex and zone of influence
(To be enclosed as Annex I and II):

Section 3: Biodiversity

3.1 Notable plant species present in wetland

Farmers cultivate lotus (*Nelumbo nucifera*) in Vellayani lake for their livelihood. Plants like *Ceratophyllum demersum, Eriocaulon setaceum, Hydrilla verticillata, Najas indica* and some species of *Utricularia* are present in the lake. The rooted but submerged vegetation include species such as *Ottelia alismoides, Rotala cookii,* and *Vallisneria spiralis.* The rooted plants with floating leaves include *Aponogeton natans*, species of *Nymphaea* and *Nymphoides* and *Sagittaria guayanensis.* Anchored-emergent hydrophytes present in the lake are *Aeschynomene indica*, species of *Eleocharis, Hygrophila balsamica*, *Limnophila*, *Monochoria vaginalis,* and *Typha angustata*. The presence of another water fern, Azolla, has also recently been found in the lake. As a result of disturbance and habitat degradation or human intervention, the lake is also invaded by highly-tolerant, non-native species such as Water Hyacinth (*Eichhornia crassipes*), *Salvinia molesta*, and *Pistia stratiotes.* High infestation of two native plants, *Ischaemum travancorense* ('Kadakal pullu' in Malayalam) and *Leersia hexandra* ('Eercha pullu' in Malayalam) belonging to the grass communities was observed.

3.2 Notable animal species present in wetland

Birds: More than 170 species of birds including wetland and migratory. (Annex III)

Fishes: The diversity of fish fauna in Vellayani Lake is represented by 69 species, which is higher than the fish diversity in the other two freshwater lakes in Kerala, Sasthamkotta and Pookkod. The wetland supports many fish species including some indigenous fish species like: *Puntius ticto punctatus, Puntius sarana subnasutus, Etroplus suratensis* etc. In addition to this, exotic species such as Catla (*Catla catla*), Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*), and Common Carp (*Cyprinus carpio communis*) have also been introduced into the lake. The lake is also reported to be rich in freshwater molluscs and freshwater prawn. Freshwater prawns (Konchu) reported from the lake are *Palaemon concinnus, Macrobrachium idella, Macrobrachium rude, Macrobrachium seabriculum Macrobrachium indicum and Macrobrachium rosenbergii.* (Annex: IV)

This area also supports an excellent population of butterflies and dragonflies (Annex: V). 25 species of dragonflies and damselflies, 60 species of butterflies, 9 species of reptiles (Annex: VI) and 6 species of amphibians (Annex: VII) are reported from the wetland.

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

Plants: *Rotala cookii* **(EN)**
Animals*: Anguilla bengalensis, Anguilla bicolor,Ompok bimaculatus, Mycteria leucocephala, Threskiornis melanocephalus, Pelecanus philippensis, Anhinga melanogaster, Falco chicquera, Circus macrourus, Limosa limosa* and *Limosa lapponica* **(NT)**, *Hyporhamphus xanthopterus, Cirrhinus cirrhosus, Cyprinus carpio, Horadandia atukorali, Pseudosphromenus dayi, Oreochromis mossambicus, Channa orientalis, Aquila clanga* **(VU)**, *Pangasianodon hypophthalmus* **(EN)**

3.4 Major plant invasive alien species

Water hyacinth (*Eichhornia crassipes*), *Salvinia molesta*, and *Pistia stratiotes*. *Cabomba caroliniana* ('Manganari' in Malayalam), *Limnocharis flava* ('Manjakoova' /'Manjapola' in Malayalam).

3.5 Major animal invasive alien species

Fishes such as Catla (*Catla catla*), Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*), and Common Carp (*Cyprinus carpio communis*) are alien exotic fishes introduced to the Vellayani Lake.

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	The lake is the only source within a reasonable distance to meet the growing demand for drinking water to Kovalam and the other adjacent areas of the lake. People in Thiruvallam and Nemom divisions of Thiruvananthapuram Corporation and the Grama

Importance	Relevant for the site (please tick yes or no)	If Yes, Details (upto 50 words for each category)
		Panchayats such as Kalliyoor, Venganoor, Vizhinjam and Kovalam are mainly depending on the lake for drinking water. Several ongoing drinking water projects are in operation.
Source of water for agriculture	☑ Yes ❒No	Northern portion of this lake is changed into a reservoir and used mainly for irrigation purposes. Watershed areas of the lake are utilised extensively for a variety of vegetable cultivation.
Source of water for domestic uses such as bathing and washing	☑ Yes ❒No	Local people residing around the lake use it for bathing and washing cloths
Fisheries	☑ Yes ❒No	The lake is a major source of freshwater fishes in Thiruvananthapuram
Cultivation of aquatic food plants	❒Yes ☑ No	-
For buffalo wallowing and use of domesticated animals	☑ Yes ❒No	Duck rearing is a common livelihood practise here
Medicinal plants	☑Yes ❒No	Not assessed quantitatively
Buffering communities from extreme events as floods and storms	☑Yes ❒No	Not assessed quantitatively
Groundwater recharge and stabilising microclimate	☑Yes ❒No	The lake recharges groundwater around the wetland. Not assessed quantitatively.
Water purification	☑Yes ❒No	Not assessed quantitatively
Acts as a sink for sediments	☑Yes ❒No	Not assessed quantitatively
Has significant cultural and religious values	☑Yes ❒No	Cultural services such as bird watching, photography, boat race, religious rituals and training centres in water sports. Lotus flowers collected from

Importance	Relevant for the site (please tick yes or no)	If Yes, Details (upto 50 words for each category)
		here are used for rituals in the temples of Thiruvananthapuram District. 'Karkidaka Vavu Bali' is a set of Hindu rituals performed on a specific monsoon day in the state of Kerala, India by adherents for their deceased ancestors. People believe that the departed souls attain moksha (liberation) if the ritualistic homage is performed that day.
Is a site for recreation and tourism	☑Yes ❒ No	The area is an emerging tourist destination in Thiruvananthapuram and local peoples from nearby areas used to spend time here.
Supports noteworthy plants species	☑ Yes ❒No	Support noteworthy plant species as mentioned in 3.1
Supports noteworthy animal species	☑ Yes ❒No	Support noteworthy animal species as mentioned in 3.2
Site of high congregation of migratory water birds	☑ Yes ❒No	Presence of 92 species of wetland birds from the wetlands of Punchakkari and Vellayani has been recorded. Birds frequenting Vellayani lake and adjacent wetlands include a variety of migratory birds such as ducks, greater spotted eagle, booted eagle and white ibis. Considering the higher diversity of wetland birds in the area, this lake could be considered for protection as a Ramsar site.
Supports life cycle of fish or amphibians	☑ Yes ❒No	Support lifecycle of *Anguilla bengalensis* and *Anguilla bicolor*. Both *Anguilla bengalensis and Anguilla bicolor* are Near threatened fish species on the IUCN Red List. The eels

Importance	Relevant for the site (please tick yes or no)	If Yes, Details (upto 50 words for each category)
		spend most of their lives in freshwater at a depth range of 3-10 metres but migrate to the ocean to breed
Mining	☑ Yes ❒No	The eastern part of the lake (Palapur-Vellayani Road) is subjected to sand mining. But not assessed quantitatively
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	The local people engaged in, the harvest or processing of fishery resources to meet their dietary needs
Fishing under lease from government department	❒Yes ☑ No	❒Yes ❒No ❒Not assessed	-
Harvest of plants (without any lease or permission from government department)	☑ Yes ❒No	❒Yes ❒No ☑Not assessed	Farmers cultivate Lotus (*Nelumbo nucifera*) in the lake for their livelihood
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	Agriculture is the main land use of the lake catchment. A strong agrarian sector exists in the lake catchment, and the crops are mainly coconut, banana, paddy, tapioca and vegetables.

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)
			Kayal cultivation of rice is present in Vellayani. A fraction of the lake land has been turned into Padashekharam namely Kanjirathadikari, Mangilikar, Nilamelkari, Pandarakari, Punjakari.
Grazing	☑ Yes ❒No	❒Yes ❒No ☑ Not assessed	Livestock grazing is noted in the lake and catchment area
Religious practices	☑Yes ❒ No	❒Yes ❒No ☑Not assessed	The lake has spiritual and religious values. People perform Karkidaka Vavu Bali (Sacrificial ritual performed in memory of the departed souls of ancestors) in the lake banks. It is performed on the day of Karutha Vavu or Amavasya (non moon day)
Withdrawal of water for domestic use	☑ Yes ❒No	☑ Yes ❒No ❒Not assessed	The lake is the only source within a reasonable distance to meet the growing demand for drinking water to Kovalam and the other adjacent areas. People in Thiruvallam and Nemom divisions of Thiruvananthapuram Corporation and the Grama Panchayats such as Kalliyoor,

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)
			Venganoor, Vizhinjam and Kovalam are mainly dependent on the lake for drinking water. Too much withdrawal without considering the inflow may affect the wetland
Withdrawal of water for agriculture or fisheries	☑ Yes ❒No	❒Yes ❒No ☑Not assessed	Kayal cultivation is common in the lake.
Bathing or wallowing of domestic animals	☑ Yes ❒No	☑Yes ❒No ❒Not assessed	Use of the lake by the local people for bathing, for washing livestock and clothes would add up the pollution load into the lake
Plying of boats	☑Yes ❒ No	❒Yes ❒No ☑Not assessed	Country boats used to ply for fishing and local transport
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	Illegal exploitation of fresh water from the tributaries of the lake, preventing the runoff of water from tributaries to the lake.
Pollution	☑ High ❒Medium ❒Low	☑Present ❒ Potential	Residues of pesticides and fertilisers, and nutrient enrichment polluted the

Threat	Degree	Present or Potential	Additional information, if any
			lake. Cleaning of clothes and vehicles, and washing of animals in the lake has also caused pollution
Mining	☑ High ❒Medium ❒Low	☑ Present ❒Potential	The eastern part of the lake (Palapur- vellayani Road) is mostly subjected to sand mining. Sand mining resulted in the formation of deep trenches in the Lake in the above-mentioned regions.
Siltation	☑ High ❒Medium ❒Low	☑ Present ❒Potential	Soil erosion and the resultant siltation affect the water holding capacity of the Lake.
Encroachment	❒High ☑ Medium ❒Low	☑ Present ❒Potential	Encroachment led to the reduction of the Kayal area and affected the balance of the lake ecosystem. The Kayal reclamation project undertaken has contributed a lot in intensifying the encroachment by private agencies. Due to encroachment, there is loss of marshy lands surrounding kayal land.
Spread of invasive species	☑ High ❒Medium ❒Low	☑ Present ❒Potential	As a result of disturbance and habitat degradation or human intervention, the lake is invaded by

Threat	Degree	Present or Potential	Additional information, if any
			highly-tolerant, non-native species such as Water hyacinth (*Eichhornia crassipes*), *Salvinia molesta*, *Cabomba caroliniana* and *Pistia stratiotes*
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 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 / impoundment/diversion or any other hydrological intervention	☑	☑ Wetland / Wetlands	Within the wetland	Wetland Managem	Need to take prior permission

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
		complex boundary ❒ Zone of influence		ent Unit, SWAK	from Wetland Management Unit/SWAK
Discharge of treated sewage/ effluent / wastewater	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Within the wetland	Wetland Management Unit, SWAK, KSPCB	Need to take prior permission from Wetland Management Unit/SWAK
Construction of boat jetties, and facilities for temporary use , as pontoon bridges	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	With in the wetland	SWAK, Wetland Management Unit, LSGs, District Collector	Prior permission is to be taken from the SWAK, Wetland Management Unit and LSGs.
Aquaculture, agriculture and horticulture activities within the wetland boundaries.	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Within the wetland	SWAK, Wetland Complex Management Unit, LSGs, District Collector, Fisheries Department, Department of	Prior permission required from SWAK, Wetland Management Unit and LSGs

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
				Aquaculture	
Soil erosion and sand mining/silt removal	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Within the wetland	Wetland Management Unit, SWAK, Soil Conservation Department	Need to take prior permission for large scale silt removal (> 0.5 ha area spread / > 250m length stretch) from the Wetland Management Unit/SWAK
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
Sustainable agriculture suitable for the wetland system	☑	☑ Wetland / Wetlands complex boundary	Will ensure the conservation of the wetland with the stakeholder participation as there is a use value.

Activity	Place a tick mark if relevant	Within wetlands or zone of influence	Additional information, if any
		❒ Zone of influence	
Conservation of flora and fauna	☑	☑ Wetland / Wetlands complex boundary ❒Zone of influence	Essential to maintain the wetland ecosystem health and ensure its conservation.
Sustainable drinking water schemes	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Shall be permitted after examining its sustainability and viability
Eco-tourism	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Shall be permitted based on an approved sustainable tourism master plan. Will ensure the conservation of the wetland with the stakeholder participation as there is a use value.
Sustainable weed control	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Shall be permitted based on an approved sustainable weed control plan. Will ensure the conservation of the wetland with the stakeholder participation as there is a use value.
Traditional community fishing	☑	☑ Wetland / Wetlands complex boundary ❒ Zone of influence	Shall be permitted based on an approved sustainable fishery management plan. Will ensure the conservation of the wetland with the stakeholder participation as there is a use value.
	❒	❒ Wetland / Wetlands complex boundary ❒ Zone of influence	

Activity	Place a tick mark if relevant	Within wetlands or zone of influence	Additional information, if any

Section 10: Listing of Available Scientific Resources Used

Abhijna U G, 2016. Monitoring and assessment of a eutrophicated coastal lake using multivariate approaches, Global J. Environ. Sci. Manage., 2(3), 275-288.

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Mullakkezhil Reghunathan, V., Joseph, S., Warrier, C. U., Hameed, A. S., & Albert Moses, S. (2016). Factors affecting the environmental carrying capacity of a freshwater tropical lake system. *Environmental monitoring and assessment*, *188*(11), 1-23.

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Thomas, Jiji (2021) Avian Diversity of Vellayani Lake in Thiruvananthapuram District, Kerala, South India.International Journal of Recent Advances in Multidisciplinary Topics Volume 2, Issue 12

Veena, M. P., Achyuthan, H., Eastoe, C., & Farooqui, A. (2014). Human impact on low-land Vellayani Lake, south India: A record since 3000 yrs BP. *Anthropocene*, *8*, 83-91.

Vijayan, N. (2018). Surveillance of the Water Quality Ascertainment of Vellayani Lake. *International Journal of Engineering Research & Technology (IJERT)*, 2278-0181.

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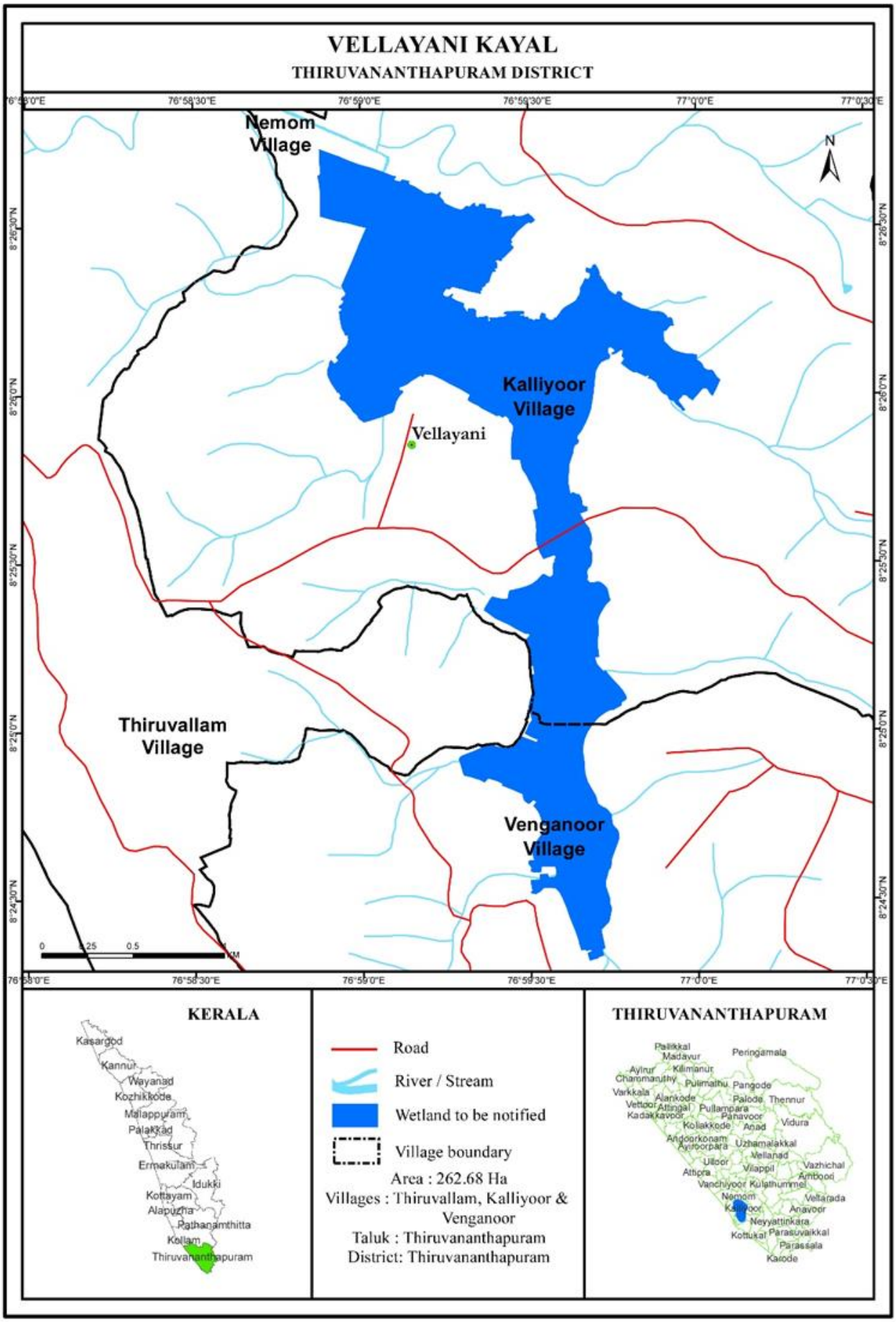
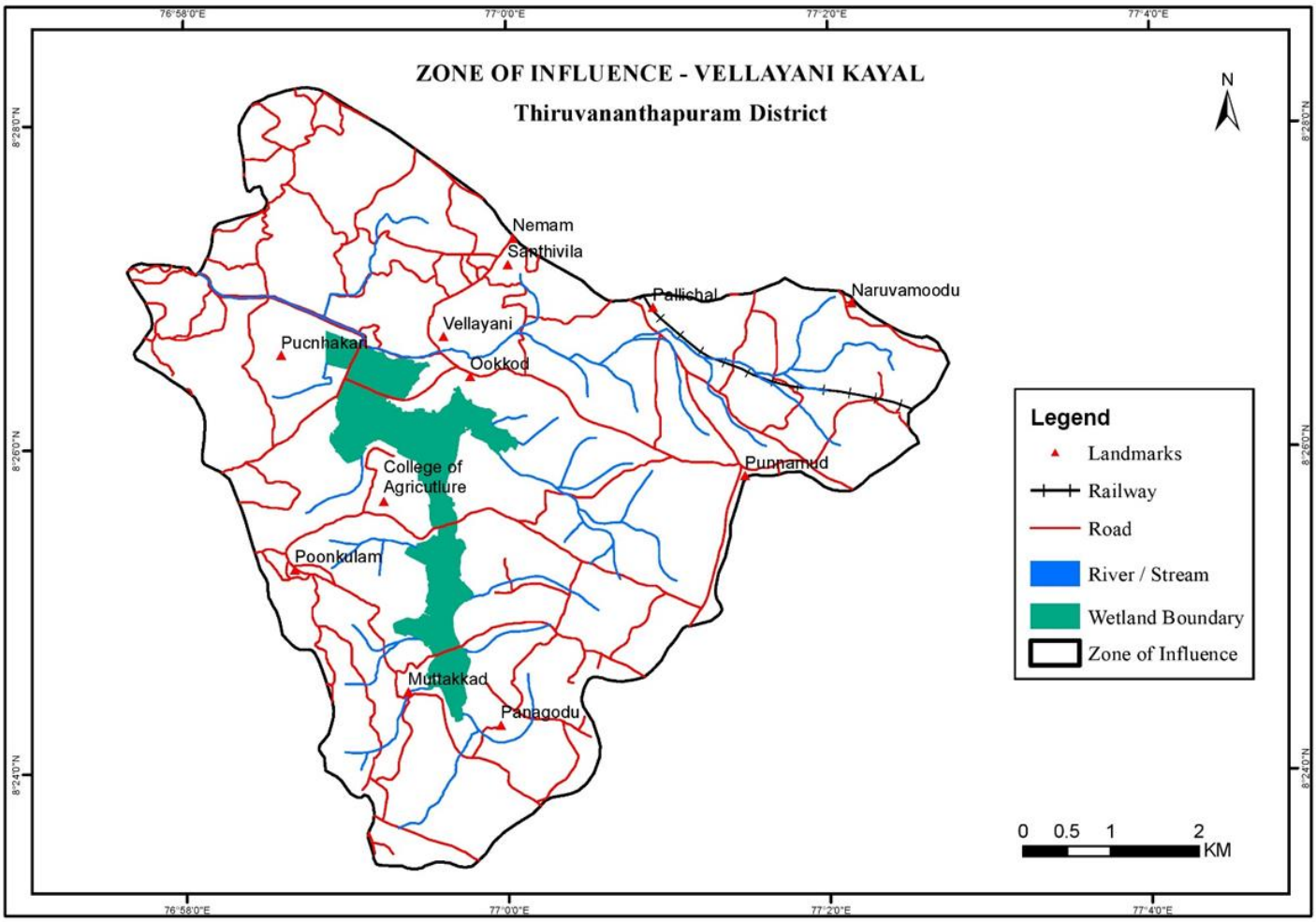
CHECKLIST

- ☑ 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


VELLAYANI KAYAL
THIRUVANANTHAPURAM DISTRICT
Nemom Village
Kalliyoor Village
Vellayani
Thiruvallam Village
Venganoor Village
N
KERALA
Kasargod
Kannur
Wayanad
Kozhikkode
Mallappuram
Palakkad
Thrissur
Ernakulam
Idukki
Kottayam
Alapuzha
Pathanamthitta
Kollam
Thiruvananthapuram
Road
River / Stream
Wetland to be notified
Village boundary
Area : 262.68 Ha
Villages : Thiruvallam, Kalliyoor & Venganoor
Taluk : Thiruvananthapuram
District: Thiruvananthapuram
THIRUVANANTHAPURAM
Nemom
Kalliyoor
Neyyattinkara
Parassala
Kaloode

Annexure II


ZONE OF INFLUENCE - VELLAYANI KAYAL
Thiruvananthapuram District
N
Nemam
Santhivila
Pallichal
Naruvamoodu
Vellayani
Pucnhakari
Ookkod
College of
Agricutlure
Punnamud
Poonkulam
Muttakkad
Panagodu
Legend
Landmarks
Railway
Road
River / Stream
Wetland Boundary
Zone of Influence
0 0.5 1 2
KM
76°58'0"E
77°0'0"E
77°2'0"E
77°4'0"E
8°28'0"N
8°26'0"N
8°24'0"N