

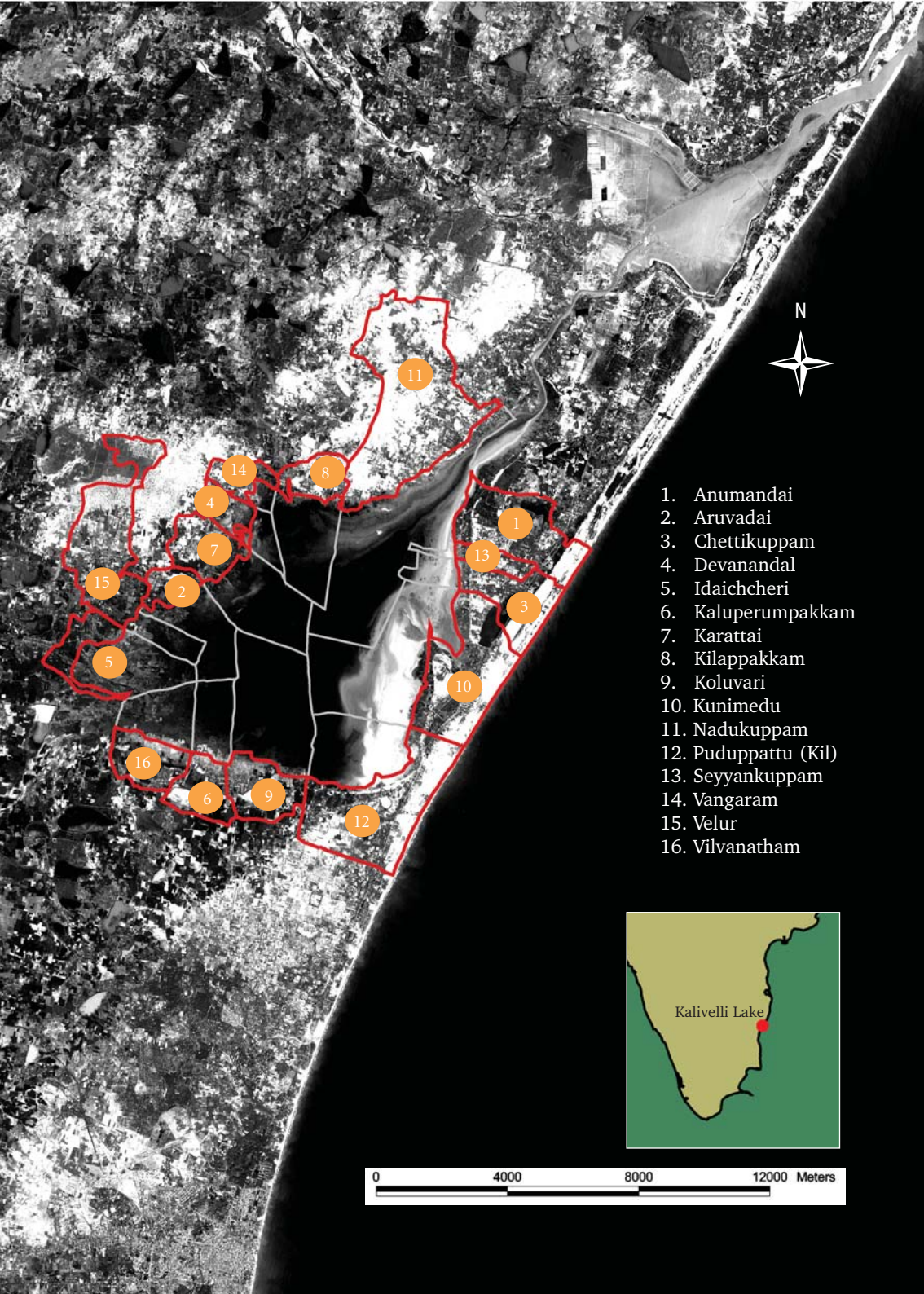


**Gopinath S  
Srinivas V**

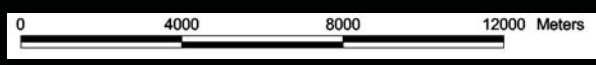
# Kalivelli Wetlands

Foundation for Ecological Research, Advocacy and Learning





1. Anumandai
2. Aruvadai
3. Chettikuppam
4. Devanandal
5. Idaichcheri
6. Kaluperumpakkam
7. Karattai
8. Kilappakkam
9. Koluvari
10. Kunimedu
11. Nadukuppam
12. Puduppattu (Kil)
13. Seyyankuppam
14. Vangaram
15. Velur
16. Vilvanatham



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# Introduction

**K**alivelli, the second largest brackish water lake in South India is located 18 kilometers north of Pondicherry in the Villupuram district of Tamil Nadu. It receives most of its fresh water from an intricate and age-old network of 225 tanks and their channels. Mis-management, changing socio-economics and policies have led to degradation of these rainwater-harvesting structures, thus altering the properties of the wetland itself.

In the year 1999, India Canada Environment Facility (ICEF), New Delhi funded an innovative effort to rehabilitate these minor irrigation tanks in the Kalivelli watershed. This effort undertaken by Palmyra, Auroville in collaboration with the Foundation for Ecological Research, Advocacy and Learning (FERAL) focuses on developing institutional structures that are sustainable, democratic and gender sensitive, which would ensure rehabilitation and sensible management of these tanks and their natural resources.

Other than physical intervention, this effort provides assistance for increasing awareness on environmental issues and encouraging community participation in management of land and water. Lessons from this five-year project will not only provide inputs for better management of the wetland itself, but will also identify community processes and dynamics that are crucial for natural resource management.

The subsequent pages focus on some of the pressing issues pertaining to the wetland that require immediate attention.







### Legends

Legend says that an ascetic (*sitthar*) who lived in Irumbai, a 11th century Chola period village, angry over the villagers' reaction to his relationship with the devadasi *Valli*, cursed the villagers and invoked Lord Shiva. In response, the lingam in the Irumbai temple exploded into pieces and was scattered several miles away. Even today, the lingam at Irumbai temple is held together with a thick copper wire. Because of the ascetic's curse, the land surrounding the village became barren and unfit for vegetation. The villagers begged pardon for their act, and the *sitthar* took his curse back. Thus the land got the name *Kazhuvelli* (in

Tamil it translates to 'an open space not under cultivation') and the ascetic *kazhuvelli sitthar*. While there are several versions of this story and conflicting views about the ascetic's power, the stone carvings in Irumbai temple provide proof for the existence of *Kazhuvelli* whose anglicized variant is Kalivelli. This historical perception of the species rich wetland as barren land is visible even today if one looked up government records.

### The Wetland

The Kalivelli watershed is spread over 776 sq km. It is the second largest brackish water lake in South India after Pulicat lake and spreads over an area of 68 sq km

water part remains seasonal, getting most of its water during the North East monsoon.

The Kalivelli watershed receives sixty four percent of its annual rainfall during the North East monsoon, between October and December. During this short but intense monsoon, the minor irrigation tanks that drain into Kalivelli are subject to high stress and are prone to flood the adjoining areas. A wetland like Kalivelli has the capacity to accommodate all the excess water and thereby prevents floods. By recharging the underground aquifers, Kalivelli provides the much-needed water for irrigation and for many of the surrounding villages this is the only source of drinking water.

The saline and fresh water nature of the lake forms a rich ecosystem that supports a variety of plants and animals. A variety of resident and migratory birds form the most prominent elements of its fauna during winter. These include flamingos, storks, ducks and egrets of different species, as well as the endangered Spotbilled Pelican. Reed (*Typha augustata*) is the predominant form of vegetation found in most parts of the lake and other grasses occupy the lakebed during the dry season.

### Mangroves

Found commonly along the coasts, they live in an environment where their roots are exposed to saltwater, sometimes every day, sometimes for only once a year. Those found along the tidal creeks and estuaries are equipped to deal with both salt and fresh water.

*A cloud burst over Kalivelli. The tanks gets sixty percent of its water from the North-East monsoon*

and is ecologically significant. There are 22 villages that surround the lake of which 16 villages have their revenue boundaries along the lake. In all, the lake supports about 64,800 people.

The lake opens to the sea at the Yedayanthittu estuary in the north, and extends southwards parallel to the east coast. The lake has two distinct parts, an estuarine part at its mouth and a fresh water part towards the southern end. Fed by the Bay of Bengal, the estuarine part has water round the year while the fresh



A firmly established network of roots plays a vital role in holding the silt in place and in preventing soil and coastal erosion. To cope with low oxygen levels in the soil, many species have evolved roots that extend a few centimeters above ground. These are covered with special breathing cells called lenticels.

Mangroves are a perfect haven and breeding ground for a variety of fish, molluscs, crabs and a variety of birds and animals. The leaf litter decomposes rapidly into simpler compounds. When washed away into the sea, these compounds become food for a number of marine animals. Thus mangroves play a vital role in the food chain, both on land and in water.

The estuarine part of Kalivelli was under mangrove cover earlier, but this is now reduced to a few mud flats with small bushes interspersed among the salt pans. A possible reason for the degradation of



*A degraded Mangrove patch near the Yedayanthittu Estuary (top), The last of the salt marsh vegetation succumbing to the ever extending saltpan boundaries.*

*Fruit Bats at a TDEF patch near Kizhpathupattu (facing page)*

mangrove cover is the ever-increasing need for firewood and timber, and the conversion of the estuarine part to salt pans. The other major reason for clearing is their swampy nature and the misconception that they play host for a variety of tropical diseases.

In the recent past, mangrove restoration programs have been initiated in and around the Yedayanthitu estuary. But the lack of effective management and protection has resulted in most of the saplings ending up as cattle feed. The last surviving patches of mangroves if not protected and restored will soon become history.

### **Tropical Dry Evergreen Forest**

In the past, a sizeable area around the lake was under what is botanically referred to as a Tropical Dry Evergreen Forest (TDEF). Most trees which go to make a forest of this kind are evergreen in nature and retain leaves all round the year, even though they do not occur in a high rainfall area. These trees are much shorter than their counterparts found in the tropical evergreen forest of the Western Ghats.

The tropical dry evergreen forest was once common along the southeast coast of India, and was the predominant vegetation of coastal Tamil Nadu. Today, only remnants of these are found in the area, with most having been cleared for agriculture and settlements. In fact, vast areas that were originally covered by this kind of forest, are now wastelands. The main causes for the degradation of this kind of forest have been fuel wood collection and grazing.

### **Salient features of Mangroves**

1. Mangroves have the capacity to fix more carbon dioxide per square meter than most other plants.
2. When mangroves are degraded, greenhouse gases are released into the atmosphere causing adverse effects.
3. The firmly established roots of mangrove forests along the coastal wetlands hold the soil in place thereby reducing soil and coastal erosion. As they are also capable of dealing with tidal

The last three pockets of TDEF, around the lake are found in Marakkanam (North of the lake), Uppuvellore (to the West) and Kizhpathupet (to the Southeast). All three patches are highly degraded. The patch at Kizhpathupet, which is about 12 ha., is also a sacred grove. This patch is





considered to be the best amongst the three because it still retains the Tropical Dry Evergreen Forest structure and species, but research points out that this patch faces the danger of being wiped out, as there is almost no regeneration.

There have been some efforts to restore the TDEF, by planting native and indigenous species, but these have again failed due to bad planning and implementation. Other attempts at reforestation have ignored the indigenous species and planted Eucalyptus as part of a social forestry program.

Rampant poaching has wiped out all wild animals in this region over the years. The forest patches still serve as a haven for a few birds and animals like the Jackal, Hare, Common Mongoose, Small Indian Civet, Palm Civet, a variety of rodents and bats.

### Birds

Kalivelli is a birding hotspot: the presence of fish and reeds creates a condition favorable for a variety of migratory birds to visit Kalivelli during winter. Many stop here on their way to Point Calimere and Sri Lanka. Some come all the way from Siberia to winter here (see bird list p. 22). The migratory period extends between October to March depending upon the availability of water.

### Poaching

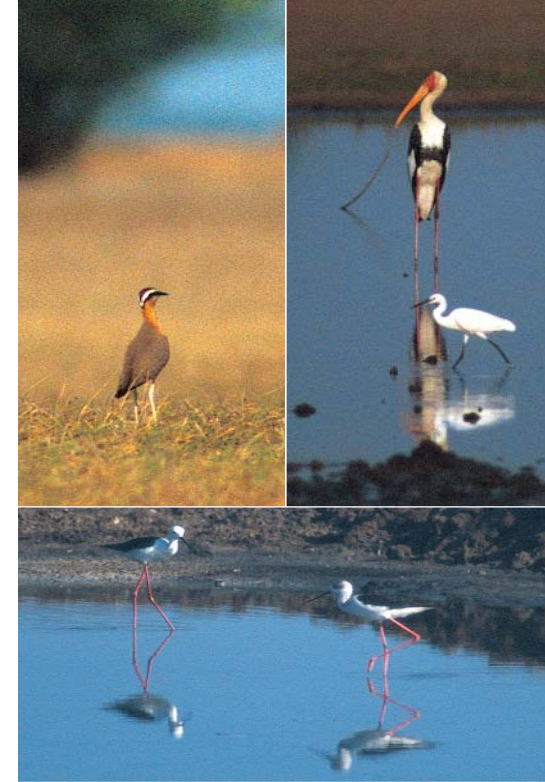
During the migratory season, as the concentration of birds increase, poaching and hunting also follows suit. A hide made out of a *palmyra* frond, is placed in the middle of the water body and left undisturbed for few days. As the birds get used to its presence, hunters hide behind this, and the birds are shot at point blank range. Interviews with locals reveal that during the migratory season many ama-

teur hunters arrive from the nearby towns.

The only community that has a legal provision to hunt is the Nari Kuravar community. Contrary to the belief that their hunting is need based and sustainable, over time the lifestyle of the community has changed greatly, and this privilege is misused. It is quite common to see Nari Kuravars selling birds in the local markets or hawking their kill in village streets. There are a number of restaurants in the adjoining towns and villages that boast of "wild" *à la carte* items in their menus to lure customers.

### Reed Collection

All the 22 villages are heavily dependent on the natural resources of the lake. Of the many resources provided by the lake, reeds form the single largest revenue-generating commodity. Reeds are tradi-



*The Indian Courser, Painted Stork and an Egret and Stilts (clockwise from top).*

## Birds of Kalivelli

1. Kalivelli hosts over 180 species of birds. In spite of its richness, there are no detailed studies on Kalivelli birds
2. The available data is largely compiled by amateur birding enthusiasts, whose methodology is often non-scientific.
3. Impacts of human activities (such as reed collection) on bird habitat are yet to be studied.
4. Despite a ban, poaching contin-





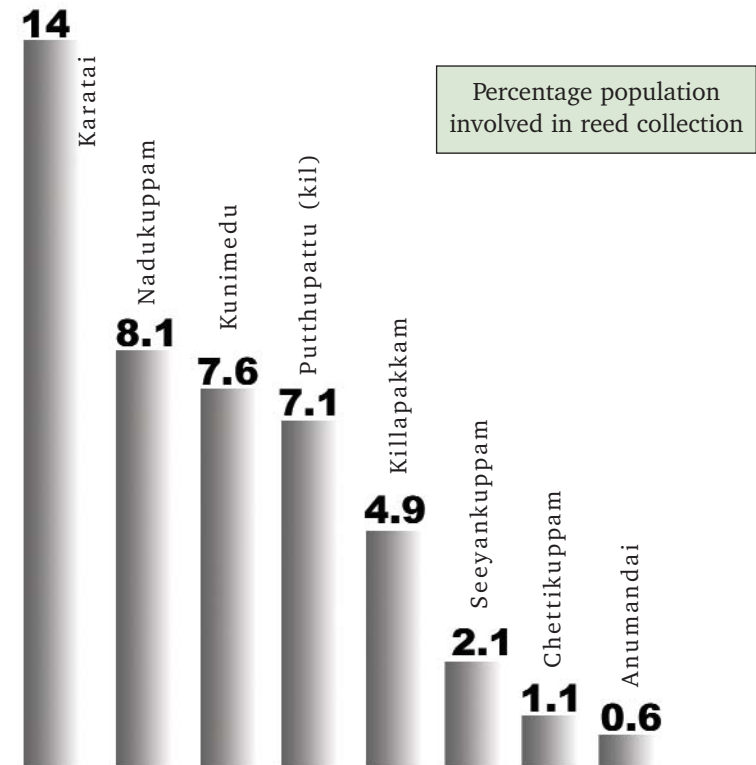
Amithab Dwivedi

tional materials which are widely used for thatching, from small huts to large houses. A reed thatch lasts for about 5 to 6 years before needing replacement. Reed harvesting begins in the month of March when patches along the periphery of the lake begin to dry up. Collection continues till about mid June.

Each village commands the right of reed collection within its boundary. Individuals mark out collection boundaries either by knotting the reeds or by clearing patches of it. There are neither rules nor regulations for the reed harvesting except in two villages. In Karatai and Nadukuppam villages, organized auction-

ing is practiced. The revenue is shared among the reed collectors, and a percentage of the gross amount goes to the village fund. Prices vary from one village to the other. A cartload usually contains 1500 to 2000 bundles and sells for anything between Rs 600 and Rs 750. Collectors usually sell the reeds directly to the users.

When reeds are cleared the land gets parched as water evaporates leaving the land barren. In an effort to regenerate the land, towards the end of the season, villagers set the remaining reeds on fire. A survey indicates that fires are almost always intentional: though there were a



A flock of Lesser Flamingoes (facing page top), Labourers harvesting reeds (facing page bottom). Reed is the single largest natural resource base of the Kalivelli tank.







Reed patches cleared by villagers to demarcate collection boundaries.

Reed collection is a source of livelihood for the surrounding villages. At the same time there are several management issues to be addressed, like how much reed needs to be cut. Does annual removal of reeds cause problems? If so, of what nature? Should removal be on a rotational basis? If so what should be the period of non-harvest? How ecologically significant are the reeds for birds, amphibians and fish? Does reed collection result in habitat loss? What effect does fire have on the reeds? Only further studies can answer all these questions!

### Fishing

Fish is another important natural resource the lake offers. The lake houses about 12 commercial species (see fish list p. 20) of fish, several species of prawns and molluscs. Fishing is seasonal and a large-scale operation is not viable. Of the 16 villages that share their boundary with the lake, only three villages are known to fish on a regular basis. During the fishing season the catch may fetch up to Rs 10,000 a month. Many agricultural labourers switch over to fishing during this season.

few instances of fire caused by careless disposal of cigarette butts by grazers or passers-by. At times when the villagers finish collecting reeds in their patch, they set them on fire. Often fire spreads to patches belonging to other villages where reed collection is yet to be done. This triggers inter-village conflicts.

Lighting of fire raises many scientific and management issues. While fire is necessary for a grassland system, the consequences of repeated burning on reed growth is detrimental. Fire is indiscriminate: it kills all the fauna and destroys the habitat of birds that nest among the reeds.



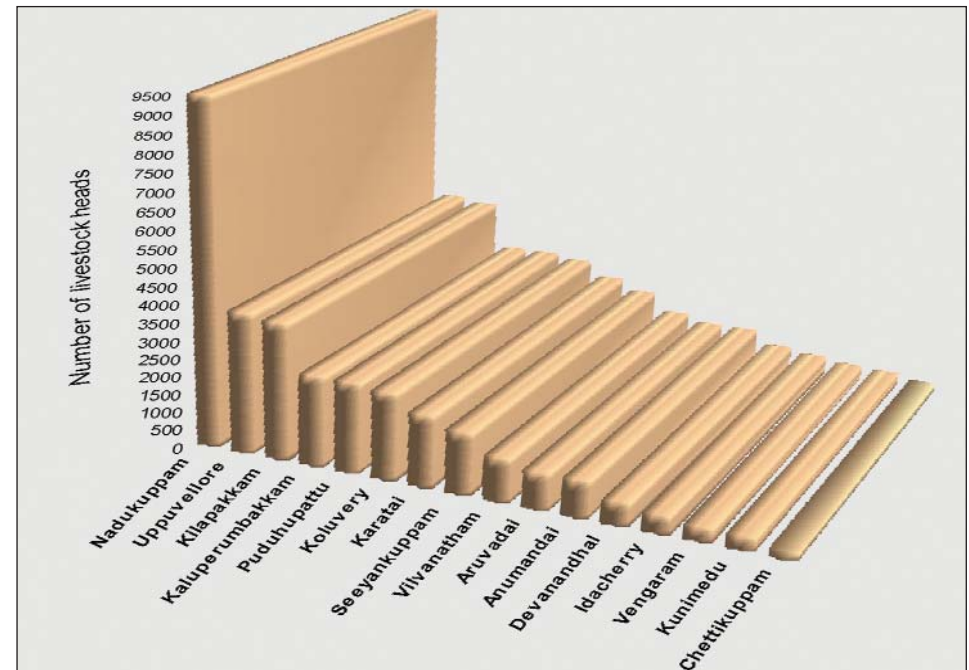
### Grazing

Grass covers the lakebed and grazing starts once the water level begins to recede. The paucity of fodder drives more than 30,000 livestock into the lakebed. In many villages Dalits are entrusted with the grazers' job. They herd the cattle or sheep from each house at daybreak and ensure that they return in the evening. In some villages each household pays about Rs 5 a month as grazer's fee and alternately one household takes the responsibility of providing food for the grazers. The labourers (grazers) also generate an additional income through the products made from collected cow dung. The majority of the cattle are of a native breed, and after a whole day of grazing they give about half a litre of milk. A study is required to provide inputs for higher milk production and at the same time reduce grazing pressures on the wetland.

### Agriculture

Among pressures on the Kalivelli wetlands, agricultural encroachments are the most lethal of all as they rob the lake of its land. Every dry season, as the water recedes, the agricultural boundaries are extended. On encroached land, at the end of each monsoon period when the water measures only a few centimeters in depth, crops are sown and left unattended. For the farmer if the seeds survive it is an additional bonus; otherwise it is not much of a loss either.

The main crop grown is paddy. As paddy is a water intensive crop, the much needed water is drawn out through bore wells. Over exploitation and inefficient use of ground water has resulted in a serious reduction in the ground water table and ingress of seawater along the coast.





The need of the hour is to help farmers in farming techniques, water management and in fertiliser and pesticide use. Interviews with farmers indicate that pesticide vendors and illegal manufacturers, capitalizing on the farmer's ignorance, promote banned pesticides. During the monsoon as the water submerges the land the chemicals find their way into the lake. The negative impacts of these chemicals on the lake's plants, fish and birds are yet to be studied.

### The Invasives

Kallivelli faces a serious threat from invasive species like the weed *Ipomea carnea*. The weed finds its way into the lake through agriculturalists and fishermen.

When land is encroached for agricultural purposes, the weed is planted to demarcate the boundaries. During the fishing season the weed is planted to hold the nets in place, and are left behind at the

### Agriculture

1. Agricultural encroachments cause serious damage to the lake.
2. A majority of the minor irrigation tanks in the region are in a degraded state.
3. Heavy dependence and inefficient use of groundwater for irrigation have resulted in drinking water scarcity and salinity problems.
4. Alternative irrigation methods that reduce water wastage are not widely practised.
5. Use of banned pesticides and its effect on the lake's life forms are yet to be studied.



end of the season. The weed being a hardy species invades the lakebed at an alarming rate. The only known usage of

the weed is the use of its dried stem to weave baskets. The baskets are used for locally transporting construction materials like bricks, cement, bluemetal mixture etc. This extraction is still insufficient to check the rate at which the weed encroaches the lakebed.

### Shrimp Farming

In many places the encroached agricultural plots have been converted to shrimp farms. Villagers of Nadukuppam, Vandipalayam and Kaaliyankuppam, found along the saline part of the lake, specialize in shrimp culture and farming. Nadukuppam village alone has about 20 farms and their numbers have tripled in the past six months. The topography of these villages is such that the tidal waters from the Bay of Bengal flow up to them. Also the subsurface water in these parts has become saline due to the presence of these farms. Taking advantage of the saline water the villagers have taken up

*Ipomea carnea* planted to hold the fishing nets in place (above and below).



shrimp farming. As the market with its insatiable appetite comes into play, farm territories are extended to the fresh water part of the lake. Despite a Supreme Court ban on converting agricultural land into shrimp farms, new farms continue to be carved out of agricultural land. Earth moving equipment is used in digging, and saline water is pumped into the farms created in the fresh water part of the lake. As the saline water is stored for extended periods the salinity gradient of the soil and ground water changes. Shrimp farms also have a vicious reputation of converting the farm and its adjoin-

*Shrimp farm exploiting groundwater.*

ing area into uncultivable lands. Despite bad experiences in the surrounding districts where shrimp farms have caused irreversible damage to the land, they flourish in these parts of the lake. This practice greatly alters the characteristics of the lake ecosystem.

### **Salt pans**

The mud flats around the estuarine area of the lake are converted into salt pans. Many salt pans found around this area belong to the Government of India's Directorate of Salt. These were created after clearing the mangroves that were originally found in these areas. Even the salt marshes around these areas are fast becoming salt pans. Only a small amount of land is still under mangrove cover. Due to prolonged use the ground water has become saline and the salt pans pump ground water to produce salt. As the market overshadows environmental concerns, more land around the fresh water edge of the lake is being converted into salt pans. This alters the salinity gradient of the soil, which affects the plant and animal life of the lake.

### **Other Threats and Problems**

Kalivelli faces other threats and problems too. Ever increasing encroachment of land for various commercial activities is one of the serious problems threatening the existence of Kalivelli. Urbanization in the region for its part also exerts a lot of pressure on the wetland. The threat from the industrial sector is menacing and there have been proposals in the past for a thermal power station, a sugar refinery and a fertiliser-manufacturing unit. There have also been proposals to convert the wetland into a fresh water source to sup-

ply drinking water to Chennai. Though none of these projects have been executed, the threat still remains.

### **Legal Status**

Kalivelli is not declared as a protected area as of now. It is unfortunate that a lake with such importance does not fall under the Department of Forests and Environment; instead the Revenue Department controls this wetland. There are a number of laws within the Constitution of India that can be directly applied in protecting Kalivelli. Listed below are legal provisions available for the protection of wetlands in India. India is a signatory of the Ramsar Convention for protection of wetland ecosystems, which it has ratified too. Protecting Kalivelli could be an important starting point.

- The 73rd Amendment of the Constitution of India
- Wildlife (Protection) Act, 1972.
- Indian Forest Act, 1927
- Forest Conservation Act, 1980
- Environment (Protection) Act, 1986
- Water (Prevention and Control of Pollution) Act, 1974
- Indian fisheries Act, 1897
- Ramsar Convention, 1971
- The World Heritage Convention, 1973
- The Convention on Biological Diversity, 1992.

### **Shrimps: the Farmer's Agony**

Vada Agaram. Just north of the wetland, the farmers confront a new farming problem: that of shrimps. This small agricultural village, connecting the estuary and wetland, is served by a perennial natural spring for its irrigation and drinking water needs. Like in many of the surrounding villages, agricultural land here has been converted to raise shrimps. But in this village the shrimp farm is located amidst other actively cultivable lands. Traditionally shrimp has been raised on a sustainable basis along with

paddy in many states in India. It was as a low investment effort and as an additional source of income. But this practice has now become commercial.

There is now extensive ground water usage with drainage canals and periodic water exchange is required for the purpose. There are pond aerators and use of external feed. High energy indigenous feeds, drugs and chemicals are applied. The negative impacts of these are already visible to the helpless farmers of this village. They see their lands being affected by the "rust" (sludge) discharged by the shrimp

farm.

With the soils slowly becoming saline, crop yields have reduced, forcing the farmers to give up cultivation altogether. The efforts made by farmers to prevent this damage have not met with any success nor shown any signs of hope. Although a ban was imposed on shrimp farming by the Supreme Court of India in 1996, such shrimp farms continue to be operational and new ones are being started. This has been made possible by the Aquaculture Authority Bill passed in the Rajya Sabha in 1997. Such bad policies and the lack of political will to protect





### Why do we need Kalivelli?

1. Wetlands have an incredible capacity to accommodate a large quantity of water. During the rainy season, they play a crucial role in preventing floods by controlling rapid run-off of water.
2. Kalivelli's capacity to store a huge amount of water helps in effective water table recharge.
3. Wetlands like Kalivelli host a variety of plant and animal life forms.
4. The organic and inorganic nutrients present in Kalivelli create a favourable situation for feeding and spawning of fish, crustaceans, molluscs and myriad other life forms.
5. Presence of abundant food attracts birds. Many migratory birds choose Kalivelli as their wintering ground.
6. Kalivelli with its natural resources directly helps the subsistence of more than 64,800 people in the region.

## What is threatening Kalivelli?

1. Kalivelli gets its water through a network of channels in the adjoining areas. When catchments are subject to deforestation, soil erosion increases, resulting in build-up of sediments in channels and impairing the free flow of water into the lake. Reduced water flow directly affects the health of the wetland.
2. Improper land use like agricultural encroachment rob the lake of its land. Shrimp farms pose a serious threat to the lake, as effluents from these farms alter the nature of soil and water. Their numbers are fast increasing.
3. Over the last three decades the salt pans have doubled in extent and now cover about 60% of the estuary. Almost all of salt marshes are converted into salt pans.
4. Ever increasing encroachment of land for various commercial activities is one of the serious problems threatening the existence of Kalivelli.
5. The threat from the industrial sector is menacing. There have been proposals in the past for a thermal power station, a sugar refinery and a fertiliser-manufacturing unit. Though none of these projects have been executed, the threat remains very much at large.
6. Urbanisation for its share exerts a lot of pressure on the wetland. There have been proposals to convert the wetland into a fresh water source to supply drinking water to Chennai.
7. Use of banned pesticides in the encroached agricultural lands poisons animals at every level of the food chain.
8. Nitrates and phosphates used in encroached agricultural land induce excessive plant and algal growth.
9. Bad management of natural resources has resulted in over exploitation, adversely affecting Kalivelli.
10. Poaching and poisoning of birds are common.

One of the most crucial factors responsible for Kalivelli's sustained degradation is the absence of a management policy and the lack of political will to finding a viable solution to the problems facing it.

## KALIVELLI FACT FILE

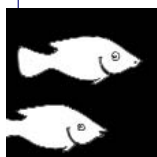
	number of villages that cover the wetland	16
	total area (hectares)	14549.86
	land under wetland	46.2 %
<b>Demography</b>	total population	40183
	male population	51 %
	female population	49 %
	senior citizens	42.1 %
	children less than 6 years	15.6 %
	literate	39.4 %
	SC and ST	21.4 %
<b>Livelihood</b>	primary occupation	Agriculture
	number of people employed	16339
	unemployed	57.4 %
	employed as cultivators	41.5 %
	employed as agricultural labourers	40.4 %
	employed as fishermen	7.2 %
	employed in other fields	10.9 %
<b>Land Details</b>	area under cultivation	31.4 %
	cultivated land dependent on surface water for irrigation	24.2 %
	cultivated land dependent on ground water for irrigation	42.14 %
	barren & uncultivable land	16.2 %
	land put to non agricultural use	22 %
	cultivable waste land	3 %
	permanent pasture & other grazing land	0.33 %
	land under miscellaneous tree crops	1 %
	land fallow	25.7 %
	land affected by salinity	4.8 %
	land with sand	2.3 %
	land with or without scrub	38.8 %
<b>Livestock</b>	cow & bull	17430
	goat & sheep	16075
	number of shrimp farms	26
<b>Resources</b>	number of villages dependent on the wetland for fishing	8
	number of villages dependent on the wetland for reeds	10
	number of villages dependent on the wetland for fodder	14
	number of villages dependent on the wetland for soil	7
	number of villages where the wetland has been encroached	4
	number of villages using the wetland for agriculture	9

Sources: 1991 Village Census Data, Statistics Department, Villupuram; Wasteland Maps; Independent surveys carried out by FERAL



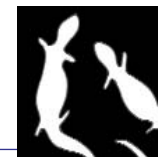
## Fish of Kalivelli watershed

Common Name	Scientific Name
Cat Fish	<i>Arius caelatus</i>
Barramundi	<i>Lates calcarifer</i>
Common Carp	<i>Cyprinus carpio carpio</i>
Grass Carp	<i>Ctenopharyngodon idellus</i>
Flathead Mullet	<i>Mugil cephalus</i>
Banded Pearl Spot	<i>Etroplus suratensis</i>
Catla	<i>Catla catla</i>
Milk Fish	<i>Chanos chanos</i>
Rohu	<i>Labeo rohita</i>
Snakehead Murrel	<i>Channa striata</i>
Silver Carp	<i>Hypophthalmichthys molitrix</i>
Tilapia	<i>Oreochromis mossambicus</i>



## Reptiles of Kalivelli watershed

Common Name	Scientific Name
Indian Black Turtle	<i>Melanochelys trijuga</i>
Indian Flapshell Turtle	<i>Lissemys punctata</i>
Common Garden Lizard	<i>Calotes versicolor</i>
Fan-throated Lizard	<i>Sitana ponticeriana</i>
South Asian Chamaeleon	<i>Chamaeleo zeylanicus</i>
Eastern Bronze Skink	<i>Mabuya macularia</i>
Keeled Grass Skink	<i>Mabuya carinata</i>
Spotted Supple Skink	<i>Lygosoma punctatus</i>
Spotted Rock Gecko	<i>Hemidactylus maculatus</i>
Bark Gecko	<i>Hemidactylus leschenaultii</i>
Asian House Gecko	<i>Hemidactylus frenatus</i>
Termite Hill Gecko	<i>Hemidactylus triedrus</i>
Bengal Monitor	<i>Varanus bengalensis</i>
Red Sand Boa	<i>Eryx johnii</i>
Checked Keelback Water Snake	<i>Xenochrophis piscator</i>
Buff Striped Keelback	<i>Amphiesma stolatum</i>
Olive Keelback Water Snake	<i>Atretium schistosum</i>
Indian Trinket Snake	<i>Coelognathus helena</i>
Common Wolf Snake	<i>Lycodon aulicus</i>
Common Bronzeback Tree Snake	<i>Dendrelaphis tristis</i>
Common Vine Snake	<i>Ahaetulla nasuta</i>
Banded Kukri Snake	<i>Oligodon arnensis</i>
Common Rat Snake	<i>Ptyas mucosus</i>
Common Indian Cat Snake	<i>Boiga trigonata</i>
Common Indian Krait	<i>Bungarus caeruleus</i>
Spectacled Cobra	<i>Naja naja</i>
Brahminy Worm Snake	<i>Ramphotyphlops braminus</i>
Saw-scaled Viper	<i>Echis carinatus</i>
	<i>Daboia russelii</i>



## Birds of Kalivelli watershed

Common Name	Scientific Name
Little Grebe or Dabchick	<i>Podiceps ruficollis</i>
Spottedbilled or Grey Pelican	<i>Pelecanus philippensis</i>
Darter or Snake-bird	<i>Anhinga rufa</i>
Little Cormorant	<i>Phalacrocorax niger</i>
Indian Shag	<i>Phalacrocorax fuscicollis</i>
Large cormorant	<i>Phalacrocorax carbo</i>
Grey Heron	<i>Ardea cinerea</i>
Purple Heron	<i>Ardea purpurea</i>
Pond Heron or Paddy Bird	<i>Ardeola grayii</i>
Cattle Egret	<i>Bubulcus ibis</i>
Large Egret or Great White Heron	<i>Ardea alba</i>
Smaller Egret	<i>Egretta intermedia</i>
Little Egret	<i>Egretta garzetta</i>
Night Heron	<i>Nycticorax nycticorax</i>
Little Bittern	<i>Ixobrychus minutus</i>
Chestnut Bittern	<i>Ixobrychus cinnamomeus</i>
Painted Stork	<i>Mycteria leucocephala</i>
Openbilled Stork	<i>Anastomus oscitans</i>
Black Stork	<i>Ciconia nigra</i>
White Stork	<i>Ciconia ciconia</i>
White Ibis	<i>Threskiornis aethiopica</i>
Black Ibis	<i>Pseudibis papillosa</i>
Glossy Ibis	<i>Plegadis falcinellus</i>
Spoonbill	<i>Platalea leucorodia</i>
Flamingo	<i>Phoenicopterus roseus</i>
Barheaded Goose	<i>Anser indicus</i>
Lesser Whistling Teal	<i>Dendrocygna javanica</i>
Ruddy Shelduck or Brahminy	<i>Tadorna ferruginea</i>
Pintail	<i>Anas acuta</i>
Common Teal	<i>Anas crecca</i>
Spotbilled Duck	<i>Anas poecilorhyncha</i>
Garganey or Bluewinged Teal	<i>Anas querquedula</i>
Shoveller	<i>Anas clypeata</i>
Wigeon	<i>Anas penelope</i>
Gadwall	<i>Anas strepera</i>
Redcrested Pochard	<i>Netta rufina</i>
Blackwinged Kite	<i>Elanus caeruleus</i>
Pariah Kite	<i>Milvus migrans</i>
Brahminy Kite	<i>Haliastur indus</i>
Indian Shikra	<i>Accipiter badius</i>
White-Eyed Buzzard Eagle	<i>Butastur teesa</i>
Egyptian Vulture	<i>Neophron percnopterus</i>

## Bird list Contd...

Pale Harrier	<i>Circus macrourus</i>
Montagu's Harrier	<i>Circus pygargus</i>
Pied Harrier	<i>Circus melanoleucos</i>
Marsh Harrier	<i>Circus aeruginosus</i>
White Bellied Sea Eagle	<i>Heliaeetus leucogaster</i>
Crested Serpent Eagle	<i>Spilornis cheela</i>
Peregrine Falcon	<i>Falco peregrinus</i>
Indian Kestrel	<i>Falco tinnunculus</i>
South Indian Grey Partridge	<i>Francolinus pondicerianus</i>
Jungle Bush Quail	<i>Perdica asiatica</i>
Indian Whitebreasted Waterhen	<i>Amaurornis phoenicurus</i>
Indian Purple Moorhen	<i>Porphyrio porphyrio</i>
Coot	<i>Fulica atra</i>
Indian Moorhen	<i>Gallinula chloropus</i>
Pheasant-Tailed Jacana	<i>Hydrophasianus chirurgus</i>
Red-Wattled Lapwing	<i>Vanellus indicus</i>
Yellow-Wattled Lapwing	<i>Vanellus malabaricus</i>
Greyheaded Lapwing	<i>Vanellus cinereus</i>
Blackbilled or Grey Plover	<i>Pluvialis squatarolo</i>
Eastern Golden Plover	<i>Pluvialis dominica</i>
Large Sand Plover	<i>Charadrius leschenaultii</i>
Indian Little Ringed Plover	<i>Charadrius dubius</i>
Ceylon Kentish Plover	<i>Charadrius alexandrinus</i>
Pamirs Lesser Sand Plover	<i>Charadrius mongolus</i>
Whimbrel	<i>Numenius phaeopus</i>
Curlew	<i>Numenius arquata</i>
Blacktailed Godwit	<i>Limosa limosa</i>
Spotted or Dusky Redshank	<i>Tringa erythropus</i>
Common Redshank	<i>Tringa totanus</i>
Marsh Sandpiper	<i>Tringa stagnatilis</i>
Greenshank	<i>Tringa nebularia</i>
Green Sandpiper	<i>Tringa ochropus</i>
Wood or Spotted Sandpiper	<i>Tringa glareola</i>
Terek Sandpiper	<i>Tringa terek</i>
Common Sandpiper	<i>Tringa hypoleucos</i>
Turnstone	<i>Arenaria interpres</i>
Pintail Snipe	<i>Gallinago stenura</i>
Common Fantail Snipe	<i>Gallinago gallinago</i>
Little Stint	<i>Calidris minuta</i>
Temminck's Stint	<i>Calidris temminckii</i>
Curlew Sandpiper	<i>Calidris testacea</i>
Indian Blackwinged Stilt	<i>Himantopus himantopus</i>
Avocet	<i>Recurvirostra avosetta</i>
Indian Stone Curlew	<i>Burhinus oedicnemus</i>
Indian Courser	<i>Cursorius coromandelicus</i>
Pratincole or Swallow Plover	<i>Glareola lactea</i>



Bird list Contd...

Brownheaded Gull	<i>Larus brunnicephalus</i>
Indian Whiskered Tern	<i>Chlidonias hybrida</i>
Gullbilled Tern	<i>Gelochelidon nilotica</i>
Caspian Tern	<i>Hydroprogne caspia</i>
Little Tern or Ternlet	<i>Sterna albifrons</i>
Blackbilled Tern	<i>Sterna acuticauda</i>
Indian River Tern	<i>Sterna aurantia</i>
Greyfronted Green Pigeon	<i>Treron pompadora</i>
Indian Blue Rock Pigeon	<i>Columba livia</i>
Indian Red Turtle Dove	<i>Streptopelia tranquebarica</i>
Indian Spotted Dove	<i>Streptopelia chinensis</i>
Roseringed Parakeet	<i>Psittacula krameri</i>
Redwinged Crested Cuckoo	<i>Clamator coromandus</i>
Ceylon Pied Crested Cuckoo	<i>Clamator jacobinus j.</i>
Common Hawk Cuckoo	<i>Cuculus varius</i>
Indian Baybanded Cuckoo	<i>Cacomantis sonneratii</i>
Indian Koel	<i>Eudynamis scolopacea</i>
Southern Crop pheasant	<i>Centropus sinensis</i>
Indian Barn Owl	<i>Tyto alba</i>
Ceylon Collared Scops Owl	<i>Otus bakkamoena</i>
Indian Great Horned Owl	<i>Bubo bubo</i>
Southern Spotted Owlet	<i>Athene brama</i>
Indian Nightjar	<i>Caprimulgus indicus</i>
Palm Swift	<i>Cypsiurus parvus</i>
Lesser Pied Kingfisher	<i>Ceryle rudis</i>
Small Blue Kingfisher	<i>Alcedo atthis</i>
Whitebreasted Kingfisher	<i>Halcyon smyrnensis</i>
Bluetailed Bee-Eater	<i>Merops philippinus</i>
Green Bee-Eater	<i>Merops orientalis</i>
Indian Roller	<i>Coracias benghalensis</i>
Hoopoe	<i>Upupa epops</i>
Crimsonbreasted Barbet	<i>Megalaima haemacephala</i>
Goldenbacked Woodpecker	<i>Dinopium benghalense</i>
Indian Pitta	<i>Pitta brachyura</i>
Redwinged Bushlark	<i>Mirafra erythroptera</i>
Ashycrowned Finch Lark	<i>Eremopterix grisea</i>
Rufoustailed Finch Lark	<i>Ammomanes phoenicurus</i>
Malabar Crested Lark	<i>Galerida cristata</i>
Eastern Skylark	<i>Alauda gulgula</i>
Asian House Martin	<i>Delicon urbica</i>
Striated or Redrumped Swallow	<i>Hirundo daurica</i>
Common Swallow	<i>Hirundo rustica</i>
Brown Shrike	<i>Lanius cristatus .</i>
Grey Shrike	<i>Lanius excubitor</i>
Indian Golden Oriole	<i>Oriolus oriolus</i>
South Indian Black Drongo	<i>Dicrurus adsimilis</i>

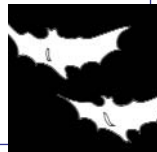
Bird list Contd...

White Bellied Drongo	<i>Dicrurus caeruleus</i>
Ashy Swallow Shrike	<i>Artamus fuscus</i>
Greyheaded Myna	<i>Sturnus malabaricus</i>
Blackheaded or Brahminy Myna	<i>Sturnus pagodarum</i>
Indian Myna	<i>Acridotheres tristis</i>
Indian Tree Pie	<i>Dendrocitta vagabunda</i>
Indian House Crow	<i>Corvus splendens</i>
Indian Jungle Crow	<i>Corvus macrorhynchos</i>
Indian Wood Shrike	<i>Tephrodornis pondicerianus</i>
Blackheaded Cuckoo-Shrike	<i>Coracina melanoptera</i>
Small Minivet	<i>Pericrocotus cinnamomeus</i>
Peninsular Indian Iora	<i>Aegithina tiphia</i>
Redvented Bulbul	<i>Pycnonotus cafer</i>
Yellowthroated Bulbul	<i>Pycnonotus xantholaemus</i>
Whitebrowed Bulbul	<i>Pycnonotus luteolus</i>
Common Babbler	<i>Turdoides caudatus</i>
Large Grey Babbler	<i>Turdoides malcolmi</i>
Peninsular Jungle Babbler	<i>Turdoides striatus</i>
Whiteheaded Babbler	<i>Turdoides affinis</i>
Brown Flycatcher	<i>Muscicapa latirostris</i>
Brownbreasted Flycatcher	<i>Muscicapa muttui</i>
Paradise Flycatcher	<i>Terpsiphone paradisi</i>
Bluethroated Flycatcher	<i>Muscicapa rubeculodes</i>
Blacknaped Blue Flycatcher	<i>Monarcha azurea</i>
Indian Tailorbird	<i>Orthotomus sutorius</i>
Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>
Orphean Warbler	<i>Sylvia hortensis</i>
Lesser Whitethroat	<i>Sylvia curruca</i>
Magpie Robin	<i>Copsychus saularus</i>
Burmese Pied Bushchat	<i>Saxicola caprata</i>
Blackbacked Indian Robin	<i>Saxicoloides fulvicata</i>
Orangeheaded Ground Thrush	<i>Zootera citrina citrina</i>
Whitethroated Groundthrush	<i>Zootera citrina cyanotus</i>
Indian Tree Pipit	<i>Anthus trivialis</i>
Paddyfield Pipit	<i>Anthus novaeseelandiae</i>
Forest Wagtail	<i>Motacilla indica</i>
Northern Yellowheaded Wagtail	<i>Motacilla citreola</i>
Pied or White Wagtail	<i>Motacilla alba</i>
Large Pied Wagtail	<i>Motacilla maderaspatensis</i>
Tickell's Flowerpecker	<i>Dicaeum erythrorhynchos</i>
Loten's Sunbird	<i>Nectarinia lotenia</i>
House Sparrow	<i>Passer domesticus</i>
Baya Weaverbird	<i>Ploceus philippinus</i>
Whitethroated Munia	<i>Lonchura malabarica</i>
Southern Whitebacked Munia	<i>Lonchura striata</i>
Blackheaded Munia	<i>Lonchura malacca</i>



# Mammals of Kalivelli watershed

<b>Common Name</b>	<b>Scientific Name</b>
Bonnet Macaque	<i>Macaca radiata</i>
Small Indian Civet	<i>Viverricula indica</i>
Common palm Civet	<i>Paradoxurus hermaphroditus</i>
Common Indian Mongoose	<i>Herpetes edwardsi</i>
Ruddy Mongoose	<i>Herpestes smithi</i>
Jackal	<i>Canis aureus</i>
Flying Fox	<i>Pteropus giganteus</i>
Shortnosed Fruit Bat	<i>Cynopterus sphinx</i>
Indian Pipistrelle	<i>Pipistrellus coromandra</i>
Three Stripped Palm Squirrel	<i>Funambulus palmarum</i>
Indian Mole Rat	<i>Bandicota bengalensis</i>
Indian Field Mouse	<i>Mus booduga</i>
White Tailed Wood Rat	<i>Rattus blanfordi</i>
Common House Rat	<i>Rattus rattus</i>
Bandicoot	<i>Bandicota indica</i>
House Mouse	<i>Mus musculus</i>
Black Naped Hare	<i>Lepus nigricolis</i>





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