# CASE STUDY OF DODDAGUBBI LAKE

A Technical Report prepared by the Working Group
Constituted by KSCST



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KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
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# Report on 'Case Study of Dodda Gubbi Lake'

## OBJECTIVES OF THE PROJECT:

1. To estimate the total quantity of water impounded in the lake during earlier years.

2. To assess the present status of the lake, resulting from siltation and other bad land-use practice on the periphery.

3. To identify, in general, the data to be collected for monotoring the wetlands in Karnataka State.

## 1. INTRODUCTION:

### 1.1. On Wetlands:

Wetlands have been recognised as playing an extremely valuable ecological role in collecting water during the monsoon months, and releasing it during the summer months. Also from the point of view of recreation and preservation of water fowl, wetlands play a very significant part.

In a report of the National Committee on Environmental Planning and Co-ordination, it is said: Till recently on account of in-adequate knowledge regarding the importance of Wetlands and the role they play in establishing the ecological balance, they were generally regarded as 'Waste Lands'. This attitude has led to a large scale destruction of wetlands all over the world. Low-lying areas such as marshes, and peat communities, are being drained, filled or irreversibly altered under the pretext of land reclamation. This became a matter of concern for the nature conservationist because of the threat to the survival of migratory water-fowl population which depend solely on these habitats. Wetlands are important for their ecological, floristic,

faunistic, limnological and hydrological aspects, apart from their valuable aquatic birds.

One of the most important assets of a tropical country like India is water. The availability of water in any area not only makes it possible for human beings to reside in the locality but it also enables them to pursue some occupation like agriculture, horticulture, animal husbandry, poultry keeping, pisiculture and others. It is therefore important that every bit of water that we have in our country be preserved.

There are two principle ways of conserving water. One is to ensure that the land is adequately covered with vegetation so that during the monsoon months the water percolates into the soil and recharges ground aquifers. The other method is to ensure that all the natural depressions which collect water and which are known as wetlands are preserved in such a manner that their water holding capacity is not eroded from year to year. In Europe a major Project known as Project Mar was sponsored by the International Union for Conservation of Nature with other associated bodies to save the wetlands of Europe. Apart from being essential habitats for waterfowl, and providing exciting recreation for angling and for boating, it was found that wetlands are also far more productive than terrestrial regions. In terms of kilograms or calories, far more can be got from a water area in the form of fish and other marine life than would be the case if the same area were reclaimed and wheat or cereals were grown on it. It is essential therefore that we in India make a strong effort to preserve our wetlands in such a way that they provide us with the material and aesthetic benefits which they are capable of. It is, of course, not principally for aesthetic reasons or because wetlands are an attraction for ornithologists, that we should consider their rehabilitation in Karnataka, it is really because they play a very important part in the water regime.

..2. Location and History:

The Wetland studied here is the Dodda Gubbi Tank, situated near Dodda Gubbi Village about 0.6 KM west of the BTS bus terminus. This tank in Bidrahalli Hobli, Hoskote Taluk, Bangalore District, has been in existence since 1895, and records pertaining to it are available from the year 1920 onwards.

.3. The Problem:

The Dodda Gubbi Lake has got silted up in course of time. Ever since its inception in 1895, paddy has been the principal crop around the lake. As a result of bad land-use practices, there is continuous soil erosion, and the depth of the lake has been reduced very appreciably in the last few decades. The natural vegetation around the water areas should consist of trees and soil-holding grass species. When these are cut down and replaced by agricultural crops, siltation takes place, and the capacity of the tank gets eroded from year to year.

The problem identified is thus soil erosion around the lake and siltation of the lake as also consequent reduction of the tank capacity. With this problem in mind, a working group was constituted with the following objectives.

1. To collect data on vegetation and suggest remedial measures for improving the ecological situation.

2. To evolve a methodology for study of wetlands.

2. INVESTIGATIONS:

2.1. The irrigated area of the tank is 151 acres, and the water spread area is 145 acres at full tank level. The length of the bund is about 2300 feet. There is one waste weir on the left bank which is about 167 feet, and which is of the clear overfall type. The spillage is about 3 feet, and the free board about 4 feet. The length of the channel is about 2.2 KM.

According to visual observations at the tank site, the encroachment is almost 40 acres. According to village records the original depth of the lake was approximately 37 feet in 1887, the present depth varies greatly from year to year depending on the rainfall of the South West and North East Monsoons. The exact extent of siltation is difficult to determine.

The tank is for the greater part extremely shallow. In Sept.1976 only about a fourth of the area was found to be under water. While this might be due to the bad monsoon in 1976, the other contributory factors are heavy silting, poor management of the catchment which is almost denuded, heavy drawings of water for rice cultivation, etc.

2. Land use: The land use practice followed by the villagers is very unsatisfactory, and is affecting the tank's health and ecology of the area adversely. Inspite of repeated Government attempts to persuade the villagers to go in for semi-irrigated crops like Bajara, Jowar, etc., the main crop grown is paddy, for which water from this tank is used. Agricultural operations are conducted right up to the edge of the water, without leaving space for the perennial vegetation. This has resulted in a great deal of soil erosion, and pollution through pesticides and insecticides. The tank is considerably silted up owing to operations on the banks. Cattle is freely allowed to graze on the bank and in the vicinity, preventing the growth of grass and other vegetation which should control siltation of the tank. Thus the natural vegetaion which holds soil is being altered to annual species of grass which are not very effective as soil binders.

There is very little tree cover left in the catchment. The greater part of the water is used for paddy cultivation, and this, according to agricultural experts, is not a desirable situation, for paddy, according to them, should be grown only in areas where there is adequate and natural precipitation.

3. Catchment Area: Excluding the tank, the catchment area is 3.91 sq.miles. It is sparsely wooded and most of it is under cultivation. There is extensive tapping of the tank water through

a series of wells dug around the periphery of the tank. The main crops noted in the catchment area are:

| | | |
|---|---|---|
| Cereals | Eleusing coracana Gaert | (Ragi) |
| | Zee maysl. | (Maize) |
| | Sorghum vulgare pers | (Jola) |
| Pulses | Dilichos biflorus Roxb | (Huruli) |
| | Cajanus cajan Mill sp. | (Thogari) |
| Fibre | Crotalaria Jauncea L. | (Sanabu) |
| Oil | Brassica Juncea | (Sasive) |
| | Richinus communis L. | (Haralu) |
| Flowers | Jasminum 2 sp. | (Mallige) |
| Silk Ind. | Morus | (Mulberry) |

2.4 Flora:

The vegetation of the tank could be divided into 3 zones

a) Peripheral zone with permanent grass cover, only rarely under water. The grasses are stunted, close-cropped probably by over-grazing. The plants noticed in this zone are:

Croton bonplandianus Baill.
Cynodon dactylon pers.
Eragrostis sp.
Evolvulus alsinoides L.
Glinus lotaides L.
Lindernia antipoda (L) Alston.

b) Zone of partial inudation with moist clayey soil. Despite the moisture the vegetational cover is poor and scattered. This may be due to the constant silting. The plants noticed are:

Alternanthera sessilis (L.DC)
Coldenia procumbens L.
Cyperus sp.
Desmodium triflerum (L) DC
Grangea moderaspatana (L)
Heliotropium marifolium Retz.
Phyl[illegible] nodiflora (L.) Greene
Polygonum plebium R.Br.

c) Zone of shallow water. Here the plant growth is extremely poor, and the only species noticed is Echinachloa colonum (L) Link.

2. . BIRDS:

The bird population varies from season to season. The resi-

dent population consists of Pond Herons, Cattle Egrets, Little Egrets, Redwattled Lapwings, Brahminy Kites, Large pied Wagtails, wiretailed Swallows, Whitebreasted Kingfisher, Pied Kingfisher and several others. During the migratory season from September to April, there is a large influx of waders including the Common sandpiper, Green Shank, Little Ringed-Plover, Little Stint, and several resident birds and for long periods one can see flocks of Blackwinged Stilts, Whistling Teal, Open-billed Storks, and others.

Were it not for human and cattle disturbance on the periphery of the water a much larger population of birds would probably reside here for long periods of the year.

.6. Insect Fauna:

An exploratory survey of the insects occuring in and around the tank was carried out and this provided some preliminary ideas about the entomofauna of this area. The area under water was very small and this was due to poor rainfall in that year and due to usage for irrigating the paddy fields of the village. The peripheral areas were inhabited by tiger beetles (Cicindelida) and on the sparse vegetation consisting of grass and herbs, were found Grass hoppers (Accididae), leaf-hoppers (Cicadellidae) and planthoppers(Delphacidae). The zone of partial inundation where the clayey soil was moist and caked due to cracking, yielded a few ground beetles (Carabidae) earwigs (Dermaptera) and rove beetles (Staphylinidae) which were by more abundant towards the water's edge which latter was colonised carbids, staphylinids, Octheridae, Saldidae, Ephydridae and other flies. One of the most interesting finds was the large number of dead Mayfly (Ephemeroptera)numphs lying half-buried in the soil. These nyhphs form an important link in the food-chain of an aquatic ecosystem, being the prey of many animals including fish. The cause for their death was that the heavy withdrawal of water for irrigation in a short time trapped these insects which could not move along with the receding water. A list of the major

types of insects associated with the tank is given below:

Zone: 1 (Peripheral area): Cicindelidae, Acrididae, Gryllidae, Dermaptera, Cicadellidae, Delphacidae, Chrysomelidae,

Zone: 2 (Partial inundation): Ephemeropeera, Tridactylidae, Octheridae, Saldidae, Carabidae, Staphylinidae, Cloridae, & other unidentified insects.

Agricultural operations are conducted right up to the edge of the water, without leaving space for the perennial vegetation.

.7 Monitoring of Wetlands:

At the time of the study, it was found that there was/no single person within the administration who was responsible for looking after these areas.

.8. Pertinent findings by other agencies:

Dr.A.R.Zafar of Osmania University, Hyderabad has done considerable work in the Nizamsagar and Hussainsagar Lakes. His methodology could be used for monitoring the lakes of Karnataka. It was found that in a natural lake, there is a sequential connection between calcium, magnesium, sodium and Potasium. The position is : Ca > Mg > Na > K. However, where the water is polluted, this changes to something like: Ca > Na > Mg > K. When the water gets further polluted the position is as follows:

Na > Ca > Mg > K.

Recommendations: (Suggested measures for improvement)

a) Restoring the original areas of the catchment by strictly prohibing agricultural operations in the vicinity of the lake.

b) The crop pattern followed in the vicinity should be changed; no crop which needs full irrigation should be allowed. e.g. paddy would be grown only in areas where the rainfall is adequate. Irrigation such as provided by the Dodda Gubbi

Wetlands could very well be used for other crops, and in consequence the total food output would be much higher.

c) The littoral area of the tank should be planted with perennial vegetation in order to prevent siltation.

d) Embamkments of the tank should be strengthened and the holding capacity increased.

e) Desilting of the tank should be undertaken. If transportation of the fertile soil is too expensive, this valuable material should be disposed off usefully in neighbouring agricultural lands.

f) Grazing in the catchment area should be limited and adequate grazing fees imposed.

g) Irrational use of water from the tank should be restricted, so that the water level would not fall abruptly.

h) Awareness in the village folk regarding harmful ecological impact of bad land use practice should be created. It is very essential that they be persuaded to cooperate.

i) Such wetlands should be placed squarely in the charge of a particular officer in the Department. (Miner Irrigation and Public Health) who should establish a procedure for monitoring the results of the steps taken.

METHODOLOGY FOR STUDY OF WETLANDS:

This essentially involves collection of all relevant data on Wetlands so as to generate information on the specific problems of each wetland, usage of wetlands, flora and fauna, agricultural practices in the vicinity, and so forth. Data and information to be collected would be on the following lines:

a) [illegible], extent of catchment area, etc.

b) Particulars like the past history of the lake, the total amount of water which was impounded initially, and the present situation. This would indicate the amount of siltation that has taken place. A map should be drawn of the catchment area, and information goton present land use in the catchment area.

c) To find out if the agricultural operations surrounding the lake are autorised or illegal, and what action is necessary to ensurd that the catchment area is adequately wooded again and covered with suitable grass species:

d) To make a list of the vegetation, the fish fauna, the insects and to monitor the quality of water periodically, particularly for the inflow of pesticides etc., from neighbouring lands.

Such data should be got by the spot studies supplemented by discussions with the local panchayat and by data from the records of the concerned officer in the Department of Minor Irrigation and Public Health who is in charge of the particular taluk as also from the records of the Tahsil Office. The National Committee on Environmental Planning and Co-ordination has prepared a list of wetlands of various states of India (See appendix for list of wetlands in Karnataka). One of the best methods for testing the health of a lake is to study the waterfowl in the surroundings. The source for considerable data material on this is the International Wildfowl Research Bureau.

5. SUMMARY:

Dodda Gubbi lake is an example of ecological damage wrought by improper use of wetlands. The depth of the lake, which was 31 feet around 1887 has decreased to 12 feet today. The catchment area is sparsely wooded and most of it is under cultivation with extensive tapping of the tank water through a series of wells, around the periphery of the tank. In addition to the major crop of Paddy, Ragi, Maize, Jola, Pulses, oilseeds, and mulbery are cultivated. Agricultural operations in general and paddy cultivation in particular, have resulted in a great deal of the soil erosion as well as pollution through pesticides and insecticides. There is extensive grazing in the littoral area so that the natural vegetation which holds the soil is being altered to annual species of grass which are not effective as soil binders. Very little tree cover is left in the catchment area.

Based on the above findings, the Working Group has recommended a series of measures for restoration of the tank. These measures include restrictions of agricultural operations in the vicinity of the lake, desilting of the tank, planting up of the littoral area with perennial vegetation to prevent soil erosion, and prohibition of grazing in the catchment area.

APPENDIX

## WETLAND IN KARNATAKA

| District | Name of Wetland | Nearest Village/Town |
|---|---|---|
| Belgaum | Dhupdal Lake | Dhupdal |
| | Part of Dhupdal Lake | Shiroder, Kothogi |
| Bellary | Daroji Tank | Tornagal |
| | Siruguppa Taluk Wetland | Siruguppa Taluk |
| | T.B.P. Reservoir | Hospet |
| Bidar | Fort Tank | Bidar |
| | Manjira Lif Irrigation Scheme | Kushnoor |
| | Nagora Project | Kadwad |
| | Water spread of Chulkinava Project | Basavakalyan |
| | Water Storage under Upper Mullemari Project | Kheda |
| | Water spread under Karanja Project | Bidar |
| Bijapur | Kattikamp Tank | Jamkhandi |
| | Kendur | Badami |
| | Mamadapur | Bijapur |
| Chikmagalur | Badra Reservoir | Lakka Rally |
| Chitradurga | Hadati Tank | Davanaguk |
| | Vanivilasa Sagar | Hiriyur |
| Dharwar | Devikop Tank | Kalghalgi |
| | Sasarwad | Mundargi |
| Gulbarga | Ainapur Tank | Ainapur |
| | Basaveshwar Tank | Mugalimaagaon |
| | Belagera Buggi | Belagera |
| | Bennitori | Kallhipparaga |
| | Bennitori Madu | Hebbel |
| | Bennitori Madu | Gotur |

| District | Name of Wetland | Nearest Village/Town |
|---|---|---|
| Gulbarga | Bennitori | Thansanhalli |
| | Bennitori | Malkood |
| | Bhankur Gokatta | Bhankur |
| | Bhima Kewar Kollur | Kollur |
| | Buggil Kallgi | Kallgi |
| | Buggi | Ramatirath |
| | Buggi | Rawoor, Maddi Tola |
| | Chandankhere Tank | Chandan Khera |
| | Chanderaupalli Project | Chanderaupalli |
| | Chengta Tank | Chengta |
| | Clickhalla | Halkathi |
| | Deukatunda | Kallgi |
| | Dotikol Tank | Dotikol |
| | Gokatta | Kaddaragi |
| | Gokatta | Kamknur |
| | Gokatta | Margoi |
| | Gokatta | Mutaga |
| | Gokatta | New Hebbal |
| | Gokatta Rawoor | Rawoor |
| | Gokatta Buggi | Rawoor |
| | Hanikere Halle | Henikera |
| | Hirchalla | Hukatti |
| | Hosakere Tank | Ladlapur |
| | Huded Halli Tank | Huded Halli |
| | Eugan Madu | Kallgi |
| | Hulsgud Tank | Hulasgud |
| | Kakatta | Mugalanagar |
| | Kani Tank | Malagathi |
| | Khani | Kollur |
| | Kogalgere Tank | Ladlapur |
| | Kumburkathi | Kusrampalli |
| | Kumburkathi Tank | |
| | Lingad Halla | Kodla |
| | Madan Keri | Alahalli |
| | Miryan Tank | Miryan |

| District | Name of Wetland | Nearest Village/Town |
|---|---|---|
| Gulbarga | Hidgunda Tank | Hidgunda |
| | Milan Mudu | Kallgi |
| | Mukramba Tank | Mukramba |
| | Mullan Tali | Diggoor |
| | Muriaju Hulla | Kallgi |
| | Ratkal Tank | Ratkal |
| | Rustumpur Tank | Rustumpur |
| | Suhali Gokath | Suhali |
| | Tank Arankal | Arankal |
| | Tank Rampurhally | Rampurhally |
| | Tank Tarkespur | Tarkespur |
| | Tumkunta Tank | Chincholi |
| | Upalawat | Alahalli |
| Hassan | Malaatchkat And Tank Atchkat | Channarayapatna |
| Mandya | Sangameswara Temple | Ambigarahalli |
| | Ranganathittu | Palahalli |
| Mysore | Nil | |
| Raichur | Hirekasankandi Reservoir | Koppal |
| | Mohd. Nagar | Koppal |
| | Murdi Tank | Murdi |
| | Tawargera | Koppal |
| | Wedgira Basappa Tank | Gunghalli |
| Shimoga | Anjanapura Tank | Anjanapura & Suragondana Koppa |
| | Basehalla Tank | Paradal |
| Tumkur | Kallambella Feeder | Sira |

This list is by no means complete; there are many other areas which can be included. A number of major rivers have contiguous areas which could be classified as wetlands. Where the soil is rich, these are naturally used for agricultural crops. But certain rocky areas could be selected and developed, and these stretches of water could then be used for many purposes.

5.3.1979