Wetlands Conservation & Sustainable Management in the Nilgiris

Final Project Report & Local Management Plan

Keystone Foundation,
Kotagiri,
Nilgiris, Tamil Nadu,
India

October 15th, 2006

Acknowledgements

We would like to express our gratitude to the Small Wetlands Programme of IUCN – The Netherlands Committee for supporting this initiative. If not for their timely recognition and support we would have not got the opportunity of diving into the world of hill wetlands. This project has led us to exploring and expanding our work on hill wetlands in the Nilgiris Biosphere Reserve which are home to Indigenous forest people and rare repository of mountain biodiversity.

Keystone Wetlands Team:

- Advisors – Rev. P.K Mulley – Cultural Anthropology; B.J Krishnan – Water Policy - Legal Aspects
- Anita Varghese, Ecology
- B. Sivaraj – Indigenous Knowledge
- Justin Raj – Local Resource Person
- Kunal Sharma - Forest Management
- Mathew John - Rural Management
- N. Rajendran – Indigenous Knowledge
- Pratim Roy – Ecology & Development
- Robert Leo - Rural Development
- Samita Vasudevan - Livelihoods
- Senthil Prasad - Geographical Information System
- Shiny Mariam Rehel – Botany
- Snehlata Nath - Livelihoods & Socio-Economy

October 12, 2006, Keystone Centre, Kotagiri, Nilgiris

Introduction

The Nilgiris are located between 11 10 and 1130 N latitude and between 76 25 and 77 00 E longitudes at the junction of the Eastern Ghats and the Western Ghats, or Sahyadris, the two prominent mountain ranges that run almost parallel to the coastlines of Peninsular India. The Nilgiris is home to unique wetlands that are the source of sustenance of numerous animals and human communities. Wetlands are among the more important reservoirs of biodiversity that nature has painstakingly crafted over millions of years. Wetlands are highly productive are cradles of biological diversity, providing the water and primary productivity upon which countless species of plants and animals depend for survival. They form refuge areas in times of drought, provide important breeding and nursery areas for a large range of animals. An immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish, and mammals form part of a wetland ecosystem.

The threatened wetlands of the Nilgiris

However, wetlands are also a widely neglected ecosystem. Often regarded as wastelands, wetlands continue to be among the world's most threatened regions. Most of them have been converted for agriculture, ongoing drainage, conversion, pollution, over-exploitation, fishing, real estate development and even building parks. The concern for conserving them have been steadily rising over the years and received a big push with the signing of the Ramsar Convention in 1971.

Globally and in India, wetlands are facing relentless pressure. They have been steadily and rapidly disappearing across the country over the past decades. The most severe impact has been from man and his activities that are commonly termed as anthropogenic pressure. Besides, increased threat of invasive plant species has also accelerated loss of wetland habitat.

Destroying or degrading wetlands can lead to serious consequences, such as increased flooding, extinction of species, and decline in water quality.
The rich biodiversity that we often see in wetlands, though abundant, is most vulnerable to any change in wetland ecology. Much of this

biodiversity stands to be lost forever if wetland resources are not used judiciously. Whether in the hills or plains, wetlands need to be preserved. The immense loss and undermining of wetland status needs to be reviewed, active rethinking must happen and restorative action undertaken to preserve our wetlands.

In the **Nilgiris,** wetlands have been perceived as wastelands associated with disease, difficulty and danger. Emphasizing the negative impacts and ignoring their importance, these habitats were considered obstacles in the path of progress and hence drained, filled, despoiled and degraded for economic gains. The wetland loss has been responsible for bringing to the verge of extinction many species of animals and plants. Inadequate understanding of the crucial role and utility of wetlands is a matter of serious concern.

Historically, most wetland losses were due to agriculture. Today, the most common threat to Nilgiris wetlands is **development** because of fertile soil and location, many wetland areas are desirable for farming, business and housing developments and form localized high population zones within the Hill District.

In fact, a preliminary analysis suggests that the region has suffered an immense amount of loss in the number of wetlands due to agricultural interventions in the plain, fertile, valley areas. Lately, wetland losses are also due to other developmental activities like housing, community halls, toilets, schools as well as other business activities like eucalyptus oil distillation plants.

Other threats come from:

- **Invasive species**: Wattle, *Ulux spp., Cytissus spp., Lantana camara* is widespread at all sites. Invasive were found growing on the edges of the swamps forming potentially harmful threats to the health of wetland systems.
- **Exotics**: Eucalyptus species were found in upland regions along most of the protected wetlands. Visually, there seemed to be a lot of water around the trees. The trees were always found planted at the higher lands and near the source points.

- **Pesticide inflow:** Most vegetable growers are located in valleys close to wetlands. In most cases, there appears to be unrestricted access for water and no controls on the inputs of agriculture. As per our interviews and data collection, chemical runoff is very high.

Usage of wetland resources is taken to points of breakdown, with tea plantations being raised till the edge of the wetland and in areas like Gudalur, tea was being raised on top of wetlands. In spite of knowing from experience, that tea will not do well in these regions; farmers act in ignorance and contribute towards deterioration of these precious resources. The issue raised by farmers is "why leave the land fallow? This answer is difficult to answer but the team clearly understood that most of the surveyed wetlands have a high probability of contaminated water through chemical inflows.

- **Effects of Pollution -** Pesticide pollution of wetlands reduces the "crop" of aquatic insects essential for the growth and development of aquatic birds. The use of pesticides on farmland has further reduced the amount of safe habitat available for birds that already have to make do with small woodlots, hedgerows, shelterbelts, and farm ponds for nesting or feeding. Habitats bordering agricultural fields can become a liability if birds are attracted into the fields and then inadvertently poisoned by toxic insecticides. Herbicide use, in plantations, may cause ground-dwelling birds to lose the leafy shelters that protect them against predators and bad weather. The potential for the herbicide spray to drift through the air and contaminate distant wetlands through water runoff is also a concern. In Nilgiris, we already see a trend where rampant usage of pesticides has led to decreased biodiversity in these places. Though, scientific evidence is lacking, yet estimations and interviews with local people who complain about the loss of biodiversity have led us to believe that pesticides do play a major role in accentuating loss in biodiversity.

- **Grazing:** Many of the wetlands we surveyed were subjected to high levels of grazing but whether this was a pressure or a part of the ecosystem one needs to look into. Review of existing knowledge base suggests that grazing plays a positive and detrimental role in the wetland ecosystem. Local people have in fact been traditionally nurturing wetlands for the express reason of providing fodder for their cattle. Yet, as we observed in a number of places, pressure from cattle has increased manifold times and a large number of wetlands are shrinking in their

biodiversity levels. Grazing stunts growth of vulnerable plants and wildlife is forced to compete with cattle for the limited amount of fodder available.
Utilization of wetlands as grazing lands, if properly managed, proves to be a source of valuable nutrients for cattle. More villages and local people must come forward and learn from the best practices of grazing from communities that have successfully managed grazing for a long time.

Wetland Management Plan

The first stage of the project was concerned with collection of data on wetlands from prominent wetlands of the Nilgiris. An attempt was made to cover as many wetlands as possible and from as many representative areas in the Nilgiris. However, the more we studied about wetlands; we realized that we have barely managed to touch the most outer surface of wetlands in the Nilgiris. For, not only were there innumerable wetlands, but each was distinct in its own way. We surveyed more than 40 wetlands and comprehensively covered about 38 of them. Along the way, we found innumerable wetlands in the Nilgiris and learnt about the amazing importance wetlands have for man and wildlife. Towards the end of the first phase of the project, we compiled all knowledge on these wetlands in the form of simple report. We made posters and organised walks in the town promoting wetland awareness and protection in vulnerable urban areas. The second stage started with more awareness campaigns that included making posters on various issues regarding wetlands.

Local management plans

In view of the time constraints for further extensive research and scientific validation of numerous findings, the team focused on particular regions and prepared local management plans for the wetlands surveyed. Out of 38 wetlands, five have been selected for further research and specific local management plans have been prepared for these.
A General management plan and local management plans for five surveyed wetlands have been prepared in collaboration with multi-stakeholders in the particular regions. A set of criteria has been developed after thoroughly analyzing the data and applicability; the wetlands were then

classified on that basis. Management plans have been outlined based on these criteria.
These wetlands were selected considering the fact that they represented different ownerships, communities and usage. The data analysed showed these wetlands as having high socio-economic dependence as well as high ecological threat. Therefore, these wetlands required immediate attention and immediate implementation of the management plans.

Classification criteria for the wetlands

Legal status of the wetlands has been used to classify the wetlands. This provides us with detailed information towards the status of wetlands. This document could be used to serve as a base for initiating further legal initiatives for the conservation of wetlands.
Most wetlands are Common Property Resources (CPRs) falling within the jurisdiction of the Panchayat and utilized as well as exploited by people and often not taken much care of. Some wetlands are private and mostly managed by tea or coffee estates. The rest fall under the criteria of protected areas and are usually under the jurisdiction of forest department or (Annexure 1: table with list of wetlands and their legal status) within the domain of government departments and institutes. In some case the wetlands have been modified as dams. Some wetlands have been formed as a result of creation of dams, where a stream or a river previously existed. Some of them are protected and the rest are also CPRs. CPRs have been further classified as CPRs in urban areas of Nilgiris, rural areas as well as those in wilderness.

Implementation of Management plan for Wetlands of the Nilgiris

Preparation of a management plan for wetlands that have multiple stakeholders is a complex effort and its implementation would be an even greater challenge in the current scenario. However, the first step needs to be taken and this effort addresses that initiative.

The first step is to identify the stakeholders and quantify usage as well as existing threats from and upon the wetlands of Nilgiris. This needs to

be followed up with awareness generation campaigns and efforts to motivate stakeholders towards formation of a committee. The committee so formed would involve stakeholders including government officials from panchayat, water and sanitation departments, besides the direct stakeholders.

Wetlands in Urban areas

Major Issues: The immediate concern in urban wetlands is that majority of them have been encroached upon and converted to residential plots or as extended kitchen gardens. Besides, garbage is dumped directly into wetlands blocking the inflow as well as outflow. In totality, "*Rules have been observed as commonly flouted and sanitation is namesake as houses adjacent to wetlands directly discharge the sewage into it*".

Socio-economic status and stakeholders in urban wetlands: In a majority of the urban wetlands, the surrounding area is inhabited by communities belonged to the lower income groups. Among the lower income group, most are directly dependent on the wetlands.

People who are directly depended on wetlands for their income activity include washer men, small vegetable growers and other small time workers like mechanics and shops owners making use of wetland water. This is not the rule, for exceptions exist, when persons belonging to higher income also occupy prime areas adjacent to the wetlands. As is common in urban areas worldwide, residents do not belong to one particular community but are from various cultural backgrounds.

There are the other residents who are not depended on wetlands for economic activities but draw water from wells dug adjacent to the wetland for domestic purpose.

Urban wetland stakeholders

- Washer men
- Mechanics
- People using water for domestic usage
- Small scale business like saw mills
- Floriculturists
- Small scale agriculturalists
- Panchayat

In most urban CPRs, wetland areas have shrunk due to encroachment and the quantum of garbage is more than the original wetland vegetation leading to some wetlands resembling a garbage dump. However, in spite of low density and diversity of wetland plants in badly affected wetlands, there are remnants of original wetland plants indicating, that a particular site was infact - *a wetland*.

A prime concern surrounding these wetlands is the lack of ownership and cultural significance among the residents on the town. Unlike villages of The Nilgiris, inhabited by homogenous groups and indigenous people, towns have an amalgamation of people from various cultural backgrounds. This causes lack of cultural association with wetlands, lack of ownership and corresponding lack of affiliation with wetland resources, other than for commercial and personal extraction of these resources.

Local management plan for wetlands in urban areas

- A stakeholder analysis by us would help explain the complex needs and values that wetland would present to them.
- Involvement of stakeholders in all dialogues between the communities and panchayat/ municipal to work on measures like garbage disposal, water management, preservation of wetland, equitable and just use of wetland resources. This would involve standardizing mutually agreeable rules to limit exploitation of natural resources as well as abuse in other forms like garbage and sewage disposal. These rules could be developed in consensus with the community.
- Awareness generation using posters, media, local clubs and cultural associations.
- Involving young adults and school children in restoration and monitoring activities. School children are a highly potent means towards

achieving the goal of wetland restoration and conservation. They need to be involved in activities like tree-planting and weeding activities.

- Restoration activities with the involvement of stakeholders to restore natural environment.
- Teachers would be trained to inculcate the spirit of conservation in children who are at an impressionable ages and conduct conservation activities such as taking students for practical sessions like preparing an inventory of bird, plant, insect and other small animals.
- Community development projects and measures to alleviate poverty which causes abuse of wetlands should be specifically designed and targeted towards these stakeholders who form a large constituent of the stakeholder community.
- Facilitated by civil society organizations, stakeholders in collaboration with government officials would establish standards for development, refurbishing of the infrastructure, waste disposal, and treatment of sewage, control of litter and optimum use of the fragile eco-system accordingly.
- Finally, responsibilities and roles for each stakeholder for implementing and monitoring the management plan.

Wetlands in rural areas

The survey and observations suggest that wetlands in rural areas can be classified into broadly two types depending on the usage.

Type I: Encroached Common Property Resources

In this category, there are wetlands which are CPRs by classification and have been encroached for construction of community halls, schools, public toilets etc. In addition the source has been tapped for supplying drinking water to towns and villages.

This case is seen in villages surrounding the major towns of Kotagiri, Coonoor and Ooty. The above constructions have been carried out by the panchayat on CPR land. Wetlands fall under this category as they are classified as 'wastlelands' in legal terms.

Most of these wetlands in areas like Denad, Longwood Shola and others have been tapped to supply drinking water to Coonoor, Kotagiri and some big hattis (Badaga Villages) in the region. Construction has shrunk the size of the wetland and reduced the natural vegetation of the region. Moreover, wastes from toilets and other outlets spoil the water quality which could be harmful to animals and plants alike. This is a very serious condition and a major disease outbreak is highly likely in the near future. It would infact be extremely unhygienic to supply drinking water from these sources without taking comprehensive measures to protect the source as well as the wetland zone.

In some places, water tests detect an abnormally high presence of coliform bacteria which is a dangerous carrier of many diseases.

In these sites, the stakeholders are varied in their economic and cultural profile. However, most of the people who live adjacent to the wetlands are farmers belonging to the Badaga community, while those enjoying the benefits of the water supply live away from the source zones.

Management Action Needed - As Type I wetlands do not directly benefit villagers, an incentive package would be needed to be incorporated into the management plan. The town or hatti receiving the water supply would have to take up an active role and provide an incentive to the villagers for keeping the area garbage and sewage free.

Here again the panchayat would have to play an active role in keeping the area free of garbage and for diverting or treating the sewage. Water tests should be carried out and the quality monitored frequently to prevent the spread of water-borne diseases.

The principle of '*Polluter Pays*', though considered impractical in Indian conditions is one of the major ways to control the growing degradation of

the wetland. In the Nilgiris, the major beneficiaries of wetland resources of this type is the Urban or homogenous village areas.
A dweller who resides in such a place should and must pay for the loss and degradation that is occurring within the wetland. He must form an association that overlooks the status of the wetland. Whether it be monetary compensation to the adjacent people or infrastructural development, the initiative is his. The '*polluter/user must pay*' is not a negative term as a large number of resource users together would need to contribute a miniscule amount from his income so as to be able to protect, conserve and preserve his water source. The initiative and overall direction can be taken up by organizations like Keystone and other civil organizations but in making the Panchayat the focal point of the entire initiative lies the strength. The Panchayat is the main implementing agency and it should oversee the status changes in the wetlands lying under its jurisdiction. The Panchayat should introduce regulatory measures to ensure social, cultural and environmental sustainability.

Type II: Direct access Stakeholders

Wetlands in type II are either private or CPRs, the users and beneficiaries directly derive economic benefit from wetland resources.

Large areas in the valley have been converted into agricultural fields. These developments have been triggered by a host of factors, including the fallout from intrusion of the money society, large scale migration into the hills and breakdown of sustainable means of livelihood. The people who derive benefits directly fall under many categories, however they are primarily agriculturists.

In this scenario, since cultivating directly on a wetland is not possible, people have used indigenous techniques and filled the land with soil, sometimes more than three feet above the water level. They have also designed instruments that are easy to use for agriculture on such

reclaimed lands. Thus, people have adapted to the conditions and suitably modified conditions in the wetlands, so that agriculture could be carried out. It was noted, as written in the previous pages, that tea was also being grown on abnormally raised beds within wetlands. This practice is not common in the upper hill region of the Nilgiri massif but in the lower elevation regions of Gudalur taluk adjoining the Mudumalai sanctuary.

One fallout of this activity is that huge amount of pesticides are deposited into the wetland through residues emanating from agricultural fields. As most of the fields lie very close or within wetland area, pesticides get mixed within wetland surface and subsurface water quickly. *Secondly*, large numbers of pumps are used to extract water for agricultural purpose. In some cases such as unrestricted CPRs, there is indiscriminate extraction with innumerable pumps operating in the landscape while in other regions, an understanding on water usage and sharing has been approved between the community members.
Thirdly, we came across several eucalyptus oil distillation plants set up on private lands which use water directly from the wetlands and in many cases, from the source of wetlands
Most wetlands have disappeared due to the spread of agricultural and grazing land. It has been difficult to access but rough estimates suggest that a large majority of the wetlands have been converted.
The present threat is that a large number of the existing wetlands are continuously being degraded and destroyed. Therefore, management, conservation and wise use of the existing wetlands is imperative. The concern is immediate, not only for maintaining biodiversity in the region but also because it is an important source of water for direct use as well as indirectly by recharging the groundwater. Loss of this valuable water body would lead to irreparable damage to environment and human beings as well.

Management Action Needed: To prevent further degradation and assist in the management of such areas, long term monitoring plans to study the effects of the pesticides on birds and soil need to be carried

out. A more result oriented option is to assist farmers for conversion to an organic way of life. Efforts towards this have already been initiated by a number of organizations and these initiatives need to be further encouraged. Some farmers have converted back to natural means of farming. This is a long term initiative that has the potential of ushering a healthy pesticide free world.

Wetlands in Private Areas

A large number of wetlands come under the designation of privately owned wetlands. Such wetlands are under the benevolent mercy of the owners. It is indeed commendable that a large number of such wetlands have been preserved and conserved by their owners. Prominent amongst these private groups include the Chamraj Estate and Chamraj owned gardens such as Korakundha. The Korakundha estate has achieved success in conserving wetlands. As a result, tea estate thrives with biodiversity as well as ample water emanating from the innumerable wetlands that abound in the estate

However, lack of awareness about 'wetlands' is appalling when we consider the quantum of privately held wetlands. Though some estates as mentioned are well managed, many have been converted or intensely exploited. Some wetland are not provided basic recognition and commonly referred to as waterlogged area where tea cannot be grown. In such cases, wetlands are not used for any purpose but are recognized as **'wastelands'**. The major threat lies in the probability of these wetlands being converted into **'productive lands'**. Estates like Korakundah can take a lead in involving estates to refrain from misunderstanding and misusing our wetlands.

The most common utilisation that we observed was check dams having been constructed on wetlands and piped water supplied to estate colonies. Some gardens were utilizing the wetlands for fodder sources and some

for small scale activities such as floriculture. These activities were generally not intensive.

Management Action Needed: In privately held estates, it is imperative that the owners and managers be sensitised about wetlands and its values and functions. This is because wherever the wetland is being managed artificially, it must be done without causing harm to flora and fauna and wherever it is thought of as wastelands, the wetland must be set in its natural state and a limit set for reclamation for other uses

The following guidelines could be followed for conserving wetlands in private tea estates and agricultural fields:

- They would be encouraged to convert to organic or make minimum use of pesticides in places where runoff or flow from application may enter the wetland.
- Increasing their awareness levels and sensitizing them towards wetland conservation by which they would then

- Ensure that the pesticide sprayers should avoid over spraying of wetland areas.
- Wherever possible they would maintain buffer strips around wetlands where chemical praying is not carried out. This area would then trap the flow/runoff of pesticide from surrounding areas.

- They would be supported to explore possibilities for sustainable use of wetlands other than draining or filling for tea/agriculture/floriculture activities.
- On-site demonstration to restore/conserve wetlands to hold surface-runoff and maintain water table levels during dry season.
- Encourage their participation in-depth studies on the effects on biodiversity in their property.

Wetlands in Protected Areas

Wetlands in wilderness areas are mostly under the control of the forest department. A large number of them are located in protected areas where any form of usage is strictly prohibited. In cases of Reserve Forests, there is limited access to the forests. However, rules are flouted; fishing and other activities are carried out illegally. The same holds true for tourists who come to the area for picnicking. Due to lack of dustbins and not so strict adherence to rules such places are littered with evidences of firewood being used for cooking purposes etc.

Therefore, the major threat to these protected wetlands is from irresponsible human action (tourism, fishing, fuel wood collection). Besides, invasive and exotic species have also been observed to disturb the natural state of these wetlands.

Management Action needed; The following activities could be taken up by the Forest Department.

- At wetlands, where exotic plant species have invaded, local volunteers could be used to manually remove such vegetation.
- FD should gather information on preventing the spread of exotics and avoid future introductions.
- They should henceforth manage and monitor introduction of exotic species.

· FD can seek guidance and partnerships from researchers, professionals and institutes working in this area for exotic control and eradication methods.
· Ensure strict adherence to rules regarding tourism, fishing activities in the area.

For tourism activities, the following are the representative set of actions expected from department personnel and tourists as well.

Safety measures

- The entry of the number of tourists permissible should be kept within limits.
- Clear definitions of 'off limit activities', and 'off limit areas' (no private
- Enterprise to be allowed in Sanctuaries/National Parks) will be strictly enforced.
- Where private sector is involved there must be collective responsibility for laying down industry standards, ethics and fair play.
- The aim should be to have lower impact on environment and minimal infrastructure requirements.
- Casual tourists shall be discouraged. It is necessary that tourists desirous of entering forests and wilderness areas should have an interest in the flora and fauna.
- Addressing ecological and environmental concerns would form an important component of Tourism Master Plans for popular destinations.
- Revenues generated would be ploughed back for the maintenance and preservation of the environment.

Local management plans for five selected sites that represent the ecological and economical divisions within the wetlands found in the Nilgiris

One of the major aims of our project was to study and understand the ecology and role played by wetlands in the conservation of biodiversity as well as study livelihood dependence. An attempt has been made in the previous section to make management interventions and plans for urban and rural areas. These plans are extensive in their nature and are

expected to provide a baseline set of introduction to managing wetlands properly and efficiently. The above management plans open the window for large scale interventions in the coming future.

The subsequent section of the 'Wetland Management Plan' is to provide a detailed procedure and necessary action points for five selected sites in the Hill District of the Nilgiris. These five sites have been short listed after intensive exploration and social as well as biodiversity importance of the region. They are considered to be representative of wetlands that have similar features; we are thus able to break down the 38 wetlands surveyed into 5 representative types.
Above and beyond, these wetlands call for immediate attention on the part of authorities, panchayats and organizations as they may either be facing threat from encroachment, be highly polluted or very pristine, may be over exploited or face a threat of exploitation in the near future.

Taranadmund

Taranadmund is the first of five sites chosen for preparing a management plan. It lies to the west of Ooty and can be accessed through the Ooty Gudalur road through a diversion into Glenmorgan estate. Just before the Glenmorgan estate, a diversion takes us straight to Taranadmund village, from where the wetland lies at a distance of about fifty metres
Tarnadmund falls under the designation of a classic wetland with a complex shola-grassland relationship interspersed by numerous springs and some biotic interference. The traditional users of the wetland were Todas. However, with the opening up of remote regions such as this, access of these places has become comparatively simple, as a result of which outsiders have been able to manipulate these pristine zones for commercial reasons. In Taranadmund, some outsiders have leased the land from the Todas and practice intensive agriculture. This has affected the overall functioning of the wetland in terms of its outflow and other factors.

Biological and Botanical condition

Bird life is profuse and we were able to observe shrink, myna, crow, spotted dove, nilgiri laughing thrush, yellow breasted wagtail, pond heron.
The Shola patches are a source of water for the wetland. Shola trees are found in the upland part of the wetland. Wattle trees were found

surrounding the Shola. Forty species of flora were identified around the wetland.[1]

Threats

The wetland originates from a spring and is spread over a large plain area, wherein it is joined periodically by other inflows from the nearby Shola. By the time, the wetland travels six hundred metres; it becomes a typical water rich wetland. However, near the lower end of its course, the water is diverted for agriculture by outsiders, as already mentioned. Besides agriculture, there is a eucalyptus oil distillation unit located adjacent and partly on the wetland.

Indigenous wealth of wetlands

The Mund is an ancient habitat of the Todas and the villagers are aware of the importance of water regions such as wetlands. The team had several discussions with elders leading to much valuable information. They spoke of facets of Toda life including history, culture and relation with wetlands.

According to them, the foremost criteria for establishing a Mund are the presence of a shola, grasslands (grazing) & wetlands; In Tarnadmund, the same is followed as the origin of the wetland is adjacent to the village. Tarnadmund has 25 Toda families, more than 30 acres of cultivable land and ample land for grazing. Traditionally, the shola and wetland landscape extended to over 200 acres. This village has the biggest temple amongst all the Toda villages; and the pure line of Toda buffaloes is found here.

The wetland was earlier surrounded by grasslands and Shola forests, but is now engulfed by agricultural fields. The 30 acres of agricultural land was infact mostly a wetland. Currently, land is partly cultivated by Todas

[1] Common wetland species have been explained in greater detail n Annexure II

themselves and partly by leasees (a large number of whom are from Karnataka region) on a partnership or lease basis. There are two types of cultivated land, namely irrigated and rain fed. The elders say that the area of cultivated depends on the water availability in the particular season.

Though a part of the original wetland has been converted for agricultural purpose, the elders maintain that the existing wetland patch would be left intact. This decision has been upheld by the village members. However, they did admit that over the years, grazing land has increased and some shola patches have gone down. They say that the Todas have a spring and water source locater as well as divider. If a person locates the source of the wetland inside a particular shola, then that particular patch is conserved. No firewood or any other kind of collection is then allowed in the patch. The discussions revealed that the Todas understood the intricate relationship between wetlands and surrounding Shola forests.

According to them when a fire occurs inside a shola destroying the forest, correspondingly the wetland also dries up. They blame the artificially planted Eucalyptus and Acacia trees by the forest department for the drying up of numerous wetlands in the region, as they maintain that Eucalyptus trees tend to drain out water from the surroundings.

According to them, when an Eucalyptus tree is cut, a huge amount of water pours out from the tree. They also mentioned that Shola trees need to be planted close to each other as the intertwining of roots among them enhances their growth.

The health of a wetland and Shola are directly related to one another. In the earlier days the wetlands had many seasonal flowering plants as well as tubers and yams which were consumed by the community. However, with the decrease in Sholas and increase in agriculture over the past few years in the adjacent lands, these plants have disappeared.

According to the elders, the positive aspect is that the ecological/cultural significance attached to wetlands still exists and the younger generation is also fully aware of the importance of these wetlands. The traditional 'salt licking festival' in which salt is added to wetlands and the buffaloes made to drink the water are celebrated with as much enthusiasm as it was done previously. Besides, the traditional game of catching the buffaloes around the wetlands after the 'salt licking' is over is still followed.

Wetlands and grazing lands are clearly demarcated and care is taken to extract only what is needed. Only a few species such as reed are taken

from the shola. Besides, Todas prefer to use wood from Sholas for making sheds for their buffaloes.
However, presently the major concern of insufficient preservation of the wetland is clearly evident. Increasing biotic pressure and shrinking wetlands could well result in the altogether disappearance of wetlands. This needs to be observed for the long term scenario. It must be noted that the wetland is still intact and there are no invasive species. However, any attempt by invasives to threaten the wetland needs to be monitored and prompt action taken to weed out invasives.

Management Plan for Tarnadmund

The local management plan has been initiated in collaboration with Toda elders and the headman. According to them, the situation is increasingly getting confusing. There is lack of communication today between the Munds, although they asserted that their rituals ensure passing on of indigenous information to the younger generation.

- To bring about more cooperation between the Munds, formation of a group with one member from each Mund would be a highly innovative beginning.
- This group can be involved in the monitoring and protection activities of wetlands in Toda regions.
- The group along with the community members would ensure that the grazing land is not extended.
- The remaining small Shola patches would be conserved and subject to sustainable use.
- Currently there are no invasive species in the wetland as well as the grassland. The group would continuously keep a look-out for such species.
- Yams and other roots which were found in the wetland and consumed by the community are no longer found. Re-introducing these species could be an option.
- Agriculture on the slopes with direct drainage into the wetland is a serious threat. Intensive pesticide based cultivation is carried out presently, water contaminated with the pesticides drains into these wetlands which is used by the buffaloes and wild animals. This is one fact which the community here refuses to see. Although they accept the fact that pesticide use is high they believe it does not drain into the wetland and even if it does - it is in negligible amounts and would not cause harm to

the buffaloes. A way out for this could be conversion to organic farming. Initial technical and marketing support would have to be offered for this kind of activity. This can be linked to some of the agriculture /marketing programmes of Keystone.

· A study on effects of chemical based farming on anurans is being carried out by a Ph'd student. The results from this study if proving that harmful effects are indeed there can be used to convince Todas in this settlement as well as others of the harmful effects of pesticides.

Konnavakarai

The wetland is in the heart of the village which has a large number of households. Moreover Konnavakarai can be considered to be an urban settlement as it lies close to Kotagiri and has a number of tea factories. The population is a mix of Badagas and Tamil speaking natives from the plains.

The wetlands is covered with prominent wetland species, infact the wetland is so densely covered with these plants that water is seldom visible to the naked eye.

Threats

The once continuous wetlands have today been broken down into two with encroachments on both sides. A concrete road cuts across the wetland. On one portion is the wetland, there are numerous wells dugout along the sides. Besides, there is one panchayat well supplying water. The water from this well is pumped into an overhead tank where it is treated and supplied for drinking water purpose.

Present situation

The wetland at both the portions has been used to dump garbage by the people in the surroundings. Human excreta on the sides of the wetland add to the filth. The houses on the upper side of the wetland have sewage

flowing into the wetland. There is a public toilet adjacent to the wetland. The panchayat office is also built on one end of the wetland. In the words of the people staying adjacent to the wetland, it is a filthy place and best stayed away from living areas.

The local perspective

Local people show lack of awareness and scant regard for the wetland. The very people using the wetland water were dumping waste and sewage into it.

They complained of being helpless as there were no dust-bins or dumping yard in the area. Nor was any initiative being taken for regular cleaning of dumping places. They also criticized the lack of toilet faciltiy in the area; they said that this was the reason people polluted the open areas on the sides of the wetland.

Management Plan for Konnavakarai

The following is the management plan for the wetland which has evolved from discussions with the people and panchayat in the area.

- There is a need for awareness generation among the people as well as the panchayat about the importance of the wetland.
- The wetland needs to be fenced to protect it from further encroachment.
- A wetland management committee would be formed including the stakeholders.
- This committee would ensure that no encroachment takes place and make certain that the wetland is cleaned up. Besides they would have to ensure that no dumping takes place in the wetland. This could be done by applying social and community pressure on the offenders
- The committee would ensure construction of toilets based on needs. Fencing the wetland would protect it but the committee would need to ensure that the sides are also clean.
- The committee would introduce regulatory measures to ensure social, cultural and environmental Sustainability.
- If these strategies are not ensured in spirit, the wetland would become a breeding ground for many diseases and pollute the water. For example, since the wetland is not being allowed its natural flow, dirt and pollutants would seep inside the wells leading to possibility of epidemics.

Padanthorai

Padanthorai lies in Gudalur Taluk close to the town. It lies about 5 kilometers from the town and is a predominantly rural area. Wetlands abound in the region but most of them are exploited by residents of the region. The huge wetland at Padanthorai has already been converted to an agricultural field where a diversity of crops flourish. The crops grown include bush beans, ginger, areca nut, banana and paddy.

The wetland slopes down from the tea plantation which extends from the road above. Lands with steeper gradients grow paddy even in the drier seasons as it receives water from the runoff of the adjacent hills.

The wetland plain has been occupied by 75 families with most of the families owing between 1-2 acres of land.

A large percentage of the land is owned by Chettis, with some owned by Malayalis and Tamils. According to them, maximum land began to be converted into agricultural land some 20 years back.

The stream which flows through the wetland originates in Munnamachi and drains into Srimadurai stream and then goes towards Theppakadu .The water table is at the ground level mostly, or often very close to it

Threats

Initially there was no problem of water sharing with most people owning wells and the wetlands proving sufficient for paddy cultivation. However, in the recent few years, plantations of arecanut have sprung up in the upper portion of the watershed, which according to the people owing land in the lower portion soaks or blocks up the flow of water in their fields; a very essential condition for cultivating paddy. A major problem observed along with excessive arecanuts is that the wells in the fields are used for drinking purposes also where there is a great possibility of the water being contaminated with pesticides.

This wetland has been selected for the preparation of a management plan due to the following reasons:

- The wetland which lies at an altitude of 945 metres above sea level is lower than most wetlands surveyed during the project. It was formerly a huge wetland running into acres of land that has now been totally converted into paddy and other crop growing fields
- The land is privately owned. The wetland agriculture has its own uniqueness as the crops grown are those which require large quantities of water.
- The sources of wetlands are springs on higher elevation. Although the wetland has been converted to agricultural field it still retains some of the wetland flora and fauna. Crabs and frogs were also found in plenty and so was insect life.

Management Plan

This wetland might further deteriorate if the present agricultural pattern is intensified. Therefore, the need is to raise awareness amongst the stakeholders to carry out sustainable cultivation, which not only ensures water levels but supports other life forms too.

Besides it is also essential to work with the local people and support them to convert to organic agriculture. Irrigation water is also used for domestic purpose and by the wetland fauna; hence high pesticide levels may prove to be extremely harmful. Though farmers admitted to using pesticides, they maintained minimum usage and showed willingness to convert to organic.

Since most of the areas on the upper side are owned by Chettis they would play a crucial role and the strategy would be to encourage farmers to carry out the following practices to ensure minimum damage to wetlands and its biodiversity.

- Ploughing practices suited to wetlands e.g. using agricultural equipment suited to wetlands.
- Cultivating wetland suitable crops and plants, not water absorbing plants which would dry up the wetland.
- Rotate crops to increase soil fertility and break the life cycle of crop pesticide and thus reduce fertilizer and pesticide use.

Raliah

Raliah combines a reservoir and a vast wetland situated in the catchment region of Coonoor town with large areas of forest of Acacia, Eucalyptus and some Sholas. There is a large water body with a dry, swampy region. There is an abundance of insectivorous plants as they are mostly found in highly nutrient deficit wetlands.[2] An interesting feature in the area was the presence of a peat bog which was small in size with red scum coating on the soil as well as on the water.

Threats

The wilderness and serenity of the place provide an ideal picnic spot for the local people in Coonoor, Ooty and Kotagiri.

The following issues have been identified by the team

- tourism activities leading to waste and filth in the area
- fuelwood collection and fishing activities which could affect the forest health.
- The water tests showed the presence of coliform bacteria which causes waterborne diseases.

Management plan

The need is for proper coordination and management among the various governing bodies namely the FD, Municipal Corporation as well as the tourism department along with the local people.

We can facilitate the stakeholders to form a committee which can then identify issues and work on the management plan.

---

2 The wetland becomes nutrient deficit when the recharge of water does not take place. In a wetland like Raliah adjoining the reservoir recharge is unlikely to happen and so the high density of insectivorous plants.

The guidelines for the management plan are:

- The committee should aim at reducing trash and pollution in the area. This could be done by enforcing dumping prohibitions and placing dust-bins.
- Fuelwood for cooking and camping should be strictly not allowed and heavy fines imposed on defaulters.
- Need to undertake water quality tests regularly and find out the reasons for the impurity.
- The wetland houses a rich diversity of flora and fauna. The FD needs to document these and carry out biological/ecological monitoring work and keep a check on invasive exotic species.
- The entry of the number of tourists permissible should be kept within limits.

Nedugula

This is a continuation of the Bergani valley but more extensive and large and known to be an intensive agriculture zone. Wetlands are situated in the fields and also on one end of the agricultural operation. It is as though the wetland surrounds the agriculture enclave. Sources of the stream are in the upper reaches – bringing with them significant amount of chemicals draining from agriculture operations.

The agriculture is done with fork - as it is wetland and machines cannot be appropriate on soft, clayey, marshy soil. There are approximately 100 dugwells, 6 wells and 100 diesel pump sets. The wetland areas belong to the Government and agriculture land to the farmers. All depend on wetland sources for irrigation. They pay 150/ per farmer per year to use this water.

This wetland has been chosen to study the management of the wetland by the locals and bring out the good practices which could be incorporated into the management plans of other wetlands.

The existing management:

The once large swathe of wetland area is now agriculture field growing vegetables. One small patch of wetland remains at the boundary of the village.

This wetland is a common property resource and is managed by the community. Every-year in the summers the buffer area around the wetland is set on fire. This according to the villagers clears weeds and the ash is used to increase the fertility of soil in the agricultural fields.

The fire according to the villagers also ensures that the buffaloes do not get stuck in the pond .

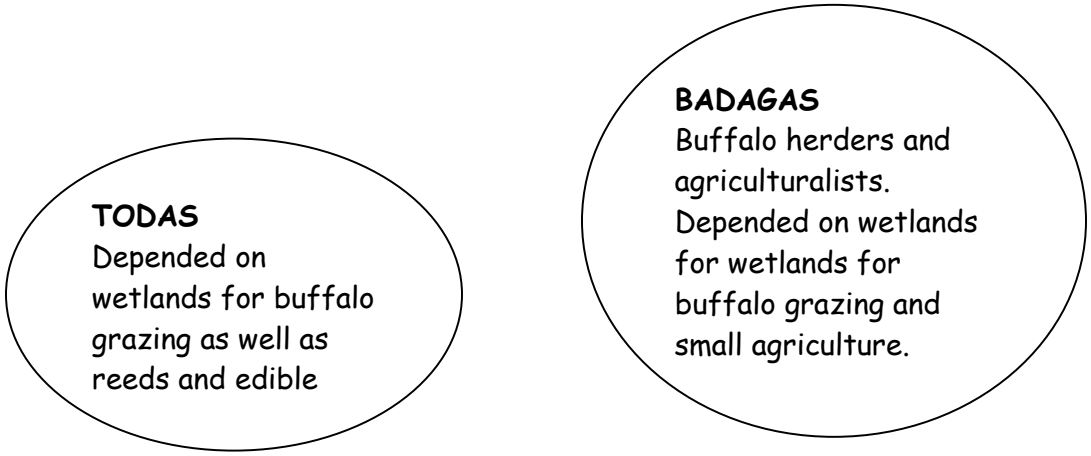
The villagers also ensure that dumping of wastes/garbage does not take place in the wetland. According to them the fire is also a good way to get rid of such wastes if any.

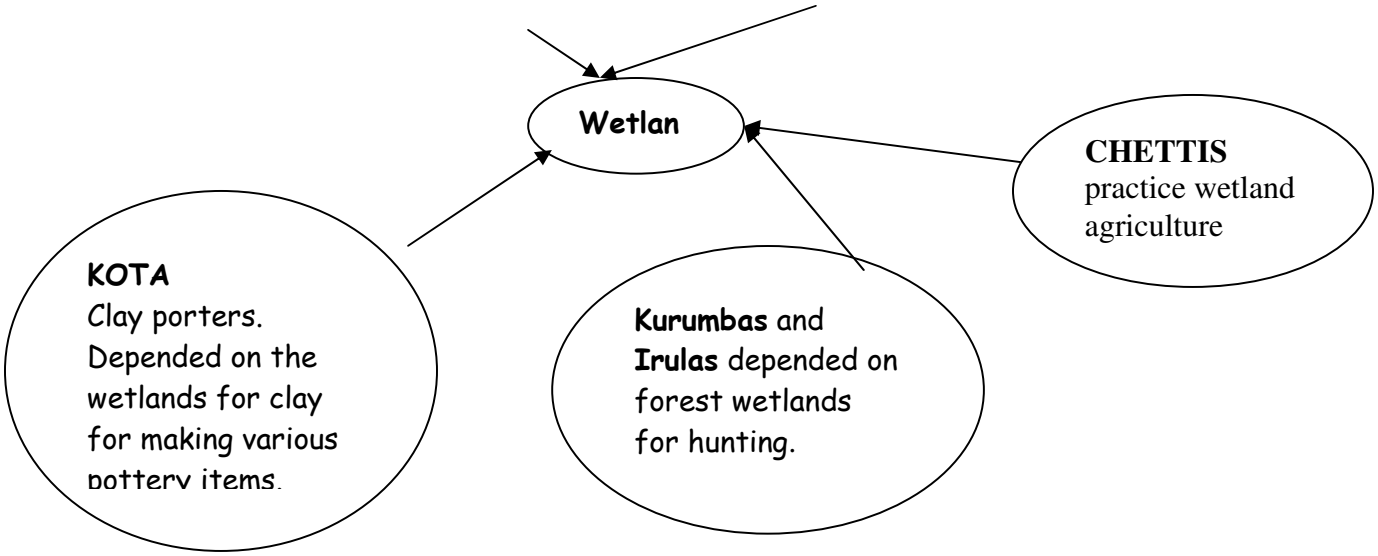
The following practices need to be incorporated:

The agriculture practiced needs to be environment friendly infact it needs to be responsible. Having already converted the wetland into agricultural fields' would have led to unaccounted loss for birds and insects.

Wetland friendly, responsible agricultural practices need to be practiced by the farmers. organic cultivation needs to be promoted as the effects of the pesticides on birds, toads and worms is well established by now.

Wetlands and its interlinkages with Culture of the people





The indigenous people of the Nilgiris especially the Badagas, Todas and Kotas were inexplicably linked to the nature in their way of life. Their livelihoods and festivals revolved around nature. 'Wetlands' of hanni in the local terminology was also revered as it was part of nature and an important link in the chain of food and economic security .

The **Todas** are traditionally buffalo herders. Even today the wetland forms an important part of their life though the lure of money has seen many wetlands being converted to agricultural fields.

A shola patch, grasslands and wetland were the three important criteria for establishing a mund. The Todas very well understood the link between sholas and wetlands. They knew that the sholas stored water and were the source of water in the wetland. These wetlands were used by the buffaloes for drinking as well resting.

The wetlands were significant as they were meant for the buffaloes which were considered sacred to the Todas. Besides, the reeds from the wetlands were put to various uses. Some were made use of in thatching roofs, some for e.g. preparing the rope used for churning the curd while some of the yams like roots were used for eating also.

Today know as agriculturists and tea growers the **Badagas** were pastoralists who owned far more buffaloes than Todas. The wetlands

divided the Toda munds and 'hattis' and often belonged to a particular village with buffaloes from the same village grazing and lolling in the wetlands. The wetlands were well protected as they were used by the buffaloes which supplied milk and so formed the backbone of their economy.

The swamps in the forests were called 'Adavi'and the Badaga believed that the genesis of the buffaloes were from these Adavis.

The buffalo hides were given to the 'Kotas' in exchange for the axe like agricultural instrument which was used for ploughing by the Badagas. The Kotas sold the hide in exchange for iron ore and other goods in the market.

Moreover the Badagas believed that the wetlands were linked to the streams and other water bodies in the region and so were to be essentially maintained and protected.

Bergani and Nedugula were huge wetlands to which spiritual and cultural significance was attached.

'Halla Parva' is a festival celebrated by the Badagas for worshipping water. The worship takes place near a spring which is the source for wetlands. This is held once a year during the dry season between February to May in different areas across Nilgiris.

But over years the importance attached to these wetlands is changing. Since the Badagas took up agriculture to buffalo rearing the importance of these wetlands and grazing lands also dwindled.

The threats to these wetlands began with the commercialization of agricultural produce. The advent of the British in the region increased the demand for vegetables .Moreover post World War II there was a huge demand worldwide for potatoes. Realizing the potential of these markets the Badagas started large scale cultivation and in the process converted many of these wetlands into agricultural fields. The British turned these CPRs into 'patta' or revenue land which also enabled/facilitated the conversion of these wetlands into agricultural fields

So, in the metamorphosis of a buffalo herding community into that of agricultural one saw the wetlands becoming insignificant and being converted to vegetable fields. Diversion of water resources for irrigation and industrial purpose also caused some of the wetlands to dry up.

The **Kotas** who are known in the region for their pottery skills depended on the wetlands for their supply of clay. They revered the wetlands and their cultural activities revolved around wetlands and pottery making.

For the **Kurumbas** and **Irulas** who occupied the lower elevations the wetlands in the forests were easy hunting grounds as for many animals the wetlands were source of drinking water.

The **Chettis** in the Gudulur region of Nilgiris were forced to occupy the lowlands which were the wetlands. They soon adopted agricultural practices suited to this region. In the earlier days they grew paddy though in the recent times they have shifted to vegetable and horticulture which is also leading to the drying up of wetlands.

The way forward

The wetland nursery:
In the context of the importance of plants for a wetland a nursery of wetland plants has already been set up in the campus. The species were also planted during the 'wetland walk' in 'Happy valley'. The plan is to have a nursery organized which could be then utilized for future restoration activities.

Poster:
Posters have been prepared depicting

- wetland biodiversity and importance,
- The cultural importance and livelihood linkage of wetlands to the people of Nilgiris.
- The wetland flora and
- Wetland birds

The same was distributed to the participants in the workshop. The posters would be translated into Tamil and would be distributed to schools, government offices as well as community clubs and organizations.

Developing a strategy and action plan for hill wetlands-a brainstorm
The brainstorm held in Ooty was a step forward towards understanding the various complexities associated with the wetlands. The participants shared their experience and expertise with the organizers. The

discussions have given the team new ideas and directions to follow and implement on field.

Implementation of management plan:
The management plans prepared for the five selected wetlands would also be implemented. Further research, advocacy and implementation activities would be carried out with the involvement of the local people

Happy valley wetland –a pilot wetland restoration and conservation activity:

Happy Valley
The mission Compound or happy wetland starts at the outskirts of Kotagiri. The happy valley wetland is unique in as much it serves as the water supply for much of Kotagiri. Besides, intensive agriculture is a common feature in the lower reaches of the valley. Being the life line of Kotagiri, it was an eye-opener for the group showcasing both sides of human behaviour – that of preservation and of exploitation.

Considering the fact that the wetland occupies a place near to the keystone office, in the heart of the town it was felt imperative to act upon.
Awareness generation activity in the form of wetland walk and poster distribution was followed by implementation work in the area as an example and a first step towards conserving the wetland.

A pilot implementation/restoration initiative:
To raise awareness and bring to light the pathetic state of the wetland the following action was undertaken:

- A walk was organized through the wetland in which school children, the local residents, keystone staff, members of kotagiri wildlife association and sanitary worker from the Panchayat participated. Posters were distributed to the residents and the garbage was also cleaned up.
- As part of restoration activity Shola trees were planted by the students in the catchment area.

Another major threat to the wetland area and the water is from the lack of sanitary facilities in the area. There was a need for 9 families to get toilets .These families were using the catchment area for attending nature's call. Providing toilets to these families would enure the waste goes into a septic tank and not into he wetlands as is happening now.
Moreover it would keep the wetland free for planting suitable species ensuring the survival of the wetland.
Hence toilet construction activity for these nine families has commenced.

Annexure 1:

List of wetlands surveyed (38 nos) with legal status
PA-Protected ara

FD-Forest department
CPR-common property resource
PVT-Private land

List of wetlands	Ownership
Bison Swamp	PA /FD
Eddapalli	CPR-rural
Emerald	CPR-rural
Tirsigadi-1	CPR-rural
Tirsigadi-2	CPR-rural
Tirsigadi-3	CPR-rural
O'valley	PVT
Konavakarai	CPR-rural
Burside / Pathimattam	PVT
Curzon	PVT
Mailoor	PVT
Kaatery	PA / Defence
Mundakund	CPR-rural
Governor Shola	PA / FD
Rifle range	CPR-Urban
Thalaikundah	CPR-Urban
Longwood Shola	PA /FD
Denad	CPR-rural
Korakundah	PVT
Halakarai	CPR-rural
Nonsuch	PVT
Sandynalla	PA / Central institution
Happy Valley	CPR-Urban
Cliffy estate	CPR-rural
Bikkapathy mund	CPR-rural
Thiashola	PVT
Manjoor Bazaar	CPR-Urban

Amugal	PA
Tarnadmund	CPR/PA
Elada	PA / Kotagiri Panchayat
Raliah	PA /FD/Coonoor-Municipality/Defence
Manvayal	PVT
Bergani	CPR-rural
Nedugula	CPR-rural
Padanthorai	PVT
Kundikodmund/Lovedale	CPR-rural
Nadgani	PA/FD
Kinnakorai	CPR-rural

List of wetland plants in nursery:

Plant	Number
Acorus calamus	539
Hedychium coronarium	8
Canarium strictum	26
Rhododendron sp.	13
Shloa spp.	123
Reed	62